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The AUTOMOBILE

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VOL. XXXVIII NEW YORK—THURSDAY, MARCH 7, 1918—CHICAGO NO. 10

New York State Failed to Remove Snow

War Trucks Average 37.4 Miles Per Day in Empire State, but 67 Miles Per Day Over the Detroit-Seaport Route—Snow Removal Caused the Difference

By David Beecroft

MOTOR trucks for war use in overland drives from the factory where manufactured to seaport have been averaging 67 miles per day for distances up to 600 miles and higher, yet railroad freight cars in the same zone of country have only been averaging 21.1 miles per day. Both of these figures represent winter possibilities, although the motor truck performance was in the midst of exceptional snow, whereas the railroad car situation represented the average for the month of November in what is known as the Eastern railroading district.

These figures not only emphasize the ability of motor trucks for winter work but we have the unexpected fact that this motor truck average was made on the war truck route from Detroit to seaport through the States of Michigan, Ohio, Pennsylvania and Maryland, and not as many might imagine through such states as New York, New Jersey, Connecticut or Massachusetts, so justly renowned for their model highway systems.

War motor trucks traveling from Buffalo to seaport over the time-famous Boston-Albany route and thence down the scenic Hudson have no such favorable report to show on maintained speeds. The best speeds over this route have shown averages of only 37.4 miles per day, or very little more than one-half the sustained speed that has been made over the Detroit-seaport route.

Here we have what appears as a real paradox in so far as improved highways in relation to motor truck performance is concerned. From Buffalo to seaport, 666 miles, there is a veritable water-level highway of the most modern kind all of the way, as compared with over 250 miles of mountain roads on the Detroit-seaport route. If the Detroit route makes possible a sustained speed of 67 miles per day the Buffalo route by all rules of comparison should have made possible certainly a higher sustained speed.

Four States Removed Snow

The reason for this discrepancy, this condition which is diametrically opposite to what might be expected, lies in the snow situation. On the Michigan-Ohio-Pennsylvania-Maryland route all four of the states rose to the war necessity of removing the snow in order that the Government might drive its war trucks overland and thereby not only economize on railroad cars but train truck drivers and truck mechanics in the work that they must do when reaching France.

New York State, contrary to expectations, failed to respond in the snow removal work and instead of trucks averaging 67 miles per day over the fine state roads their average was cut to 37.4 miles per day. It was solely due to lack of snow removal.

From Buffalo to seaport, 666 miles, required eight-

een and one-half days; from Detroit to seaport, 570 miles, required but eight and one-half days. Had the Buffalo trains averaged 67 miles per day, which they can with ease when the roads are clear, they would have made the trip in ten days and saved eight and one-half days on the trip.

At the time these trips were made General Pershing was cabling urgently for trucks and more trucks. It has apparently been necessary for the American expeditionary force to buy motor trucks in great quantities from some European countries. It has apparently been necessary to rent other trucks at high rentals from other European countries in order to meet our imperative requirements there.

What happened to New York State?

Why was it that Pennsylvania was able, beginning in December, to keep its highways clear of snow, including over 200 miles of mountain roads?

Why was it possible for the State of Ohio to keep its share of the Detroit-seaport route clear of snow as the war department desired?

Why was it possible for Maryland to keep its highways free of snow?

Why was it possible for the State of Michigan to literally build 10 miles of road on the Detroit-Toledo lap of the journey and keep the snow removed for the entire distance within its boundaries?

No State Fund for Snow Removal

But what happened in New York State? There are many legal and technical explanations: There was no State fund for snow removal. Such was not contemplated in the scheme of road maintenance expenditure within the Empire State. If snow had to be removed, the work must be done by the local authorities in the towns and cities and not by the State. The net result was that the snow was not removed. The trucks averaged 37.4 miles per day instead of 67 miles per day.

The same or similar snow handicaps existed in all of the States on the Detroit-seaport route. There were not any fat snow-removal appropriations dust hidden on the legislative shelves of the States en route. Pennsylvania, which cleared its share of the route beginning in December and kept it clear, financed the work by the State Highway Department. Here there were no special snow-removal funds, but use was made of $500,000 of a State emergency fund of $2,000,000. With this amount the State did not ask for volunteer work by farmers along the route, except in some instances at the first December snow blizzard. The State Highway Department organized for the work and carried it out.

What Was Done in Ohio

The State of Ohio did not have special snow-removal funds, but here the State government worked through the local authorities, and where local authorities had not sufficient money to do the job the State made necessary advancements, although there does not appear to have been any direct authority to warrant such expenditures. They were made as war emergency acts, in that the State had been asked to do its share of the snow-removal work and keep its route cleared of snow.

Michigan and Maryland, at both ends of the route, kept their respective stretches clear from the first snow fall, and in fact the State of Michigan went so far as to undertake to keep many of the main routes of the State open during the winter months.

But New York State, although specifically requested from Washington to clear its roads, failed to respond and we paid the price on the other side of the ocean. Apparently many failed to realize that in war times war emergency acts are not only desirable but necessary and justifiable. Apparently it was not realized that eight and one-half days saved by the trip from Buffalo to seaport is equivalent to eight and one-half days being saved with our forces in France.

610 Firms on War Work in New York

It is understood that there are 610 firms in the State of New York working on war contracts and that this number represents approximately one-quarter of the total number of firms in the country engaged on war contracts. If snow-removal activities bear any relationship to war contracts then New York State failed quite badly to give that account of itself which it should have given and which it should give as the premier State of the Union.

The States of Pennsylvania and Ohio, both great manufacturing centers, are reported to have within their boundaries one-quarter of the total number of firms engaged on war contracts. They responded to the snow-removal call.

Snow removal from main trunk highways has not yet been considered a necessary and highly essential part of the road maintenance work of a State. In other words, our improved State highways have been spring, summer and autumn highways, but only for fractional traffic in winter. War is no respecter of seasons, and while our troops on the front may be more or less inactive in wintry seasons those are the seasons when our home activities should be greatest in order to have ready for them at the opening of the spring drive all of the necessary sinews and munitions of combat.

War Demands New Methods

At home we must get this fact into our peoples and into our State governments. War emergencies and war necessities have demanded new orders of things. It is an example of new wine and new bottles must be used as well. The days of tying up our trunk highways from large manufacturing centers to seaport have passed. We do not send our soldiers to the shores of the Mediterranean to holiday in the winter months. They toil amidst snow and ice to get prepared for the spring. At home the same rule must apply. We are sharing the job with them and we must share it on as nearly equal basis as possible.

Our highways must be kept clear of snow. The war has made some of our great highways nearly as important as some of our major railroad systems. The coal crisis of a few weeks ago impressed the necessity of open trunk highways in the winter. Our steamboats do not stop crossing the ocean in the winter months and our capillary systems of trans-

portation feeding the ports of embarkation for these steamers must be kept open. Winter is the period of lowest railroad efficiency and yet it is the one period when we have been willing to nearly entirely lose the use of our trunk highways. This old rule of things must in the cause of necessary protection for our armies in France cease. New York State will have to waken before another winter if she can possibly justify her good volume of war contracts and also her admirable system of roads which are equally good in winter as in summer if the snow is removed.

The State of Connecticut, which has received a liberal share of war contracts, has set an example to the nation in the work of keeping its main highways cleared of snow, and although not on any of the war truck routes to seaport and not specially requested to do anything, the State from its own internal initiative performed a wonderful work. It was able to keep the flow of munitions from factory to seaport moving steadily in spite of railroad congestion and exceptional weather.

New York State has in the Syracuse zone of 61 miles on the main Buffalo-Albany highway six bridges which are condemned so far as carrying maximum load. These bridges are permitted to carry only 2.5 tons, and the war trucks, instead of carrying their 5-ton load of merchandise to seaport, were compelled to carry 2 tons. Apparently there were no available appropriations to repair these bridges and yet nothing has been done as a war emergency measure to take care of this. We would scarcely feel proud of our army in France were our trucks there to be carrying only a fraction of their useful load because bridges were not strong enough to carry them with their full load.

Sixty War Trucks Leave Factories Daily

At present approximately sixty motor trucks per day are leaving truck factories under the Quartermaster's direction for seaport. These are being dispatched in truck companies of thirty trucks to the company. These companies are divided into three sections of ten trucks each, with a distance of approximately 1000 ft. between sections when traveling. The trucks in a section run about 100 ft. apart. Up to the present time eight of these truck companies have come over the Detroit-seaport route and all told about 400 trucks for war purposes have been driven overland. Were these shipped on railroad freight cars approximately 200 freight cars would be required and the length of time required for the shipment would be greater than what has been required in these overland drives.

The overland drives have had the advantage of training the men in the work. Each driver makes two trips from the factory to seaport. Previous to leaving the factory on the first trip he is given a short educational course in the factory, where he not only becomes familiar with the mechanics of the truck and repair work, but also is given instruction in driving the truck.

Great improvement has been made in time schedules since the first truck companies left Detroit in December. On the first trip eighteen days were required for the 570 miles. This has been cut in half and on every successive trip the daily average is being lengthened.

Some idea of the difficulties the trucks have encountered by way of snow is shown by the figures. One truck company leaving Buffalo was able to make only 6 miles in one day leaving that city. On another day 15 miles were covered, on a third day 16 miles. When roads from which the snow was removed were encountered the daily mileage rose to 95. The mileage on the last day reaching seaport was 104. The Detroit companies have found that it is possible to average pretty close to 90 miles a day, which should take the trucks from that city to seaport in a little over 6 days.

England's Example of Snow Removal

The problem of removing the snow from highways is not new, in fact nearly a century ago England gave an example of snow removal work. In the region of Sheffield, a large manufacturing city in the North, the great English snowstorm of December 26, 1836, presented a new problem of traffic. The snow did not hold up traffic at that time and the mail stage coaches were operated on schedule. There were drifts 4 to 8 ft. deep which were shoveled through by soldiers in order to keep the highways open. Bus routes running over heights at 1000 ft. above sea level were kept open.

Still a further reason why snow removal must be given more attention and increased is the development of the public rural express company, a recent example of which is the activity in the State of Maryland. These express companies are needed as much in winter time as in summer. At present the different rural express companies of Maryland have a schedule of 1574 miles covered on a regular time table. Of this distance only 300 miles is over the improved highway system of the state. In other words, this would indicate that the snow removal work will have to be extended in many states beyond main trunk lines. At present the Bureau of Markets is undertaking an investigation of rural express systems, with the object of discovering what should be a reasonable cost for such service in different sections in order to keep these companies in healthy condition. Such investigations are being made in western New York; in the zone of New York City; in the Philadelphia zone; the Detroit zone, and in Connecticut and Ohio.

The added flexibility to our food supply is well emphasized in connection with these systems. In the rural express routes out of Baltimore, anywhere from 25 to 40 gal. of milk are being brought from farmers who live 6½ to 7 miles from railroad lines, and which milk would not reach the population centers were it not for the express system.

An example of how time is conserved was shown by a farmer 12 miles out of Washington, who required four horses to draw his 3-ton load to the city. The horses were traveling by actual time study at 2 miles per hour. With a motor truck this speed is increased in actual service to 12 miles per hour. The development of rural express lines is certain to emphasize the demand for snow removal.

Traction on Bad Roads or Land*

Comparison of Wheel and Chain-Track Methods of Drive—Braking and Side-Slip Problems—Free and Locking Differentials

By L. A. Legros

THE problems involved in the design of vehicles for traveling, or for the haulage of goods, or agricultural implements, or produce over the land or bad roads, depend for their satisfactory solution upon conditions that vary widely. The worse the condition of the road or land to be traversed, the more essential it is that due account should be taken of the nature of the ground, its inequalities, its resistance to load and to those shearing forces to which its surface is subjected by tractive effort.

The methods adopted for overcoming the difficulties peculiar to such traction problems can be divided into two main classes: The one class is that in which the driving power is distributed over more than two driving wheels; the other class is that in which the tractor drives through chain tracks which reduce the insistent load. The two classes of tractor are, consequently, applicable to different conditions, and while the methods cannot be considered as competitive, the limitations of each can be best appreciated by direct comparison of their respective peculiarities and advantages.

Under the ideal conditions of traction on rails the driving power transmitted through a single pair of wheels may suffice to haul a train of many coaches for wagons. Under the less favorable conditions of ordinary roads, a single pair of driving wheels may serve to transmit the power necessary for hauling two or more trailers. Traction on the ordinary road by metal-tired wheels, however, demands in the driving wheels a large diameter and great width of tread, in order that the insistent load may be reduced to reasonable intensity. How sensitive roads are to the loads that they carry may perhaps be best realized by considering a gravel road, on which ordinary devices can, in normal conditions, be used safely; the same devices may, however, cause serious damage when the load-carrying coefficient is even slightly disturbed, as, for example, by a thaw.

Renard Road Train

Among schemes for road haulage devised with the object of reducing the load per driving wheel may be mentioned the Renard road train, consisting of six-wheeled vehicles. The central wheels of each vehicle were metal-tired driving wheels, and the end wheels were fitted with rubber tires and Ackermann steering. The leading vehicle formed the power unit, and power was transmitted to the central axles of the other vehicles of the train by an articulated shaft. Under State subsidy the system had a fair trial in France, but it has not developed to any notable extent. The attempts at multiple-axle drive have, however, indirectly, led to the development of the four-wheel drive, a system which, while less ambitious, has considerable advantages for some conditions of traction over the ordinary two-wheel drive.

The four-wheel drive may be combined with either two-wheel steering or four-wheel steering. An example of the first of these classes, schemes for which were proposed as early as 1898, was the touring car built by Spyker, of Amsterdam, in 1903, and exhibited at the Crystal Palace in 1904. M. Brillé, in a paper read before the institution, treated of an improved motor truck of the second of these classes, driving and steering through all four wheels.

The four-wheel drive vehicles of to-day have much in common with the ordinary back-axle driven truck, in type and arrangement of the engine and its accessories, such as carbureter, radiator and clutch, and also in the arrangements of gear-box, springing and brakes. Those features only will be described, therefore, in which the four-wheel driven vehicle differs from the ordinary type.

*Paper read before the Institution of Mechanical Engineers, on Friday, January 18, 1918.

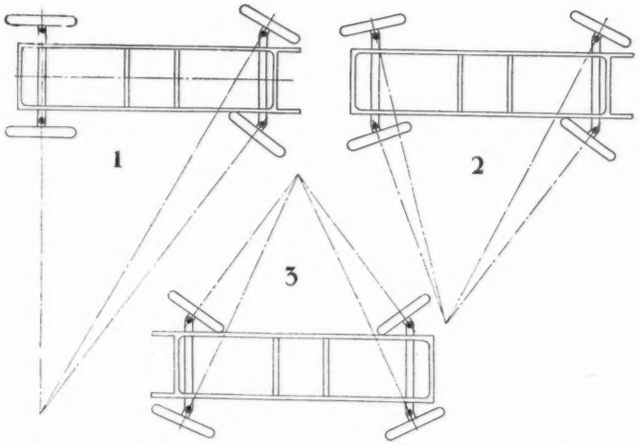


Fig. 1—Ackermann axle on front steering vehicle. Fig. 2—Non-symmetrical four-wheel steering. Fig. 3—Symmetrical four-wheel steering

Four-Wheel Steering

In the ordinary front-steering vehicle, fitted with the Ackermann axle, the design endeavors to meet the condition that in plan the axles of both front wheels shall intersect at a point on the axis of the back wheels, as shown in Fig. 1. In the four-wheel drive car with four-wheel steering the problem assumes a more general form, and the condition to be met is that the axes of all four wheels shall intersect at the same point, Fig. 2. So long as this condition is fulfilled it is not essential that the inclination of the axes to the normal shall be the same for the front and back axles; but in practice the steering is generally symmetrical, Fig. 3, and the virtual center about which the vehicle turns is situated on the normal center line. This results in a reduction of the radius of the turning circle approximately to one-half of that obtained with the same front axle and with front steering only. The vehicle has therefore much greater handiness in certain respects, but is subject to the disadvantage that if brought near a curb, and particularly a high curb, the wheels cannot be locked sufficiently to permit of taking a small turning circle in leaving. This can be a distinct disadvantage in cities, though it is to a great extent compensated for by the greater ease with which the vehicle can be manœuvred backwards.

The locking of the rear wheels restricts the space available for framing the body of the vehicle at the height of the chassis to a narrower width than with two-wheel steering. This does not affect the arrangement of a cylindrical tank or hopper-shaped body, but for the ordinary flat platform it is necessary to give greater height than in normal practice. Although the author has not found an example of the non-symmetrical steering, shown in Fig. 2, it is to be noted that conversion to this arrangement involves nothing more than altering the lengths of two levers, and that the increased width of body which could be carried direct on the chassis

might well compensate for the slight increase in the turning radius.

For driving over country roads or fields with many irregularities or obstacles the four-wheel drive has undoubted advantages, because the percentage of load available for adhesion is nearly double that of a two-wheel drive.

The application of brakes on automobile vehicles running on ordinary or bad roads involves inevitably the possibility of side-slip. It is well known that, when the coefficient of friction for lateral displacement of the tires is small, and the brakes are applied too hard on a vehicle with rear wheel brakes, side-slip will result, and the back of the vehicle will "come round" unless prevented by the skill of the driver. The extent of the slip can be reduced by releasing the brake and steering to the side toward which the back wheels are moving. When ordinary side-slip takes place on a cambered road, and the back of the vehicle is tending to approach the curb, the difficulty of arresting the movement is increased for two reasons; first, because the front wheels must be steered toward the curb, thus reducing the space available for correction of the error of movement, and secondly, because the camber of the road tends to increase the lateral velocity of the vehicle. The paths taken by the wheels respectively in an ordinary rear-wheel side-slip, on a surface which is level transversely to the direction of movement, are approximately as shown in Fig. 4, in which for the sake of clearness the front wheels are shown narrower in track than the back wheels.

Front-Wheel Slip

There is, however, another form of side-slip which is much more dreaded by the expert driver, as it is harder to check; this is front-wheel slip. On greasy asphalt, wet colite, and damp clayey roads, under normal running conditions the driver may be warned in time by the failure of the vehicle to respond to movement of the steering wheel. With this form of slip, application of the brake, resulting in the transference of some of the load from the back to the front wheels, may produce a sufficient change in the conditions to enable the path of the vehicle to be corrected. It is necessary to consider this aspect of the problem in motor vehicles that are rear-driven. As usually designed, the axle loads are approximately equal when the vehicle is stationary; but this condition is changed when the vehicle is running, for the driving torque, corresponding to the speed of the periphery of the road wheels, acts on the back axle and relieves the front axle part of the static load. Practical recognition of this fact is seen in the racing car, the evolution of which has shown a progressive increase in wheel base accompanied by forward displacement of the center of gravity of the car. A racing car of 10-ft. wheelbase with a 70-brake horse-power engine, when running at 80 m. p. h., will have a torque at the back axle of about 353 ft. lbs., but the same vehicle if climbing a hill with a gear ratio of 3.5 to 1 (reducing the speed to 23 m. p. h.) will have a torque at the back axle of 1235 ft. lbs., transferring about 1 cwt. from front to back wheel. If, on the other hand, the rear-wheel brake is applied on an ordinary vehicle, the reverse torque so set up may easily be much larger than this; and the resulting change of load conditions on the wheels may therefore increase the insistent load on the front wheels sufficiently to obtain the necessary friction between road and wheel for steering. It is obvious that front-wheel driving implies heavier loading on the front wheels, and involves greater difficulty for the driver in correcting front-wheel side-slip should it occur.

For stoppage under conditions of good road grip the four-wheel brake acting equally on all four wheels is ideal; by the use of compensating gear the braking action can be distributed equally over the four wheels, and for any given speed the car can be stopped in a much shorter distance than with two-wheel braking. When, on the other hand, the surface is greasy, a skilled driver has greater control over a vehicle braked only on the back wheels.

Four-Wheel Driving

Starley's application of the differential gear to the back axles of vehicles as a means of compensating for inequalities in diameter or in travel of the wheels requires further extension in the case of the four-wheel drive. When the vehicle is driven mechanically by a single gasoline motor, it is not only necessary to provide a differential gear on each axle, but, when these are of the ordinary bevel or spur types, a third differential gear must also be interposed between the two axles to compensate for differences in the mean diameters, and consequently in the revolutions made by the respective pairs of wheels. This introduces a further complication in the problem of driving. In the ordinary two-wheel drive if one driving wheel is held and the other is off the ground, the latter will revolve, other things being equal, at double the speed at which the pair would revolve if both were free; whereas if with the arrangement of three differentials three wheels are held and one wheel is off the ground, this wheel will revolve at four times the mean speed at which the four would revolve if free or driving normally. Conditions under which the load on any one wheel is so far reduced as to allow of slipping occur frequently on very uneven ground owing to release of spring pressure, and they also occur on ground presenting considerable fluctuations in coefficient of friction. To enable the four-wheel drive vehicle, fitted with the usual bevel or spur-wheel types of differentials, to work under these conditions it has been found necessary to fit a differential lock to the main or central differential on the longitudinal driving shaft connecting the two axle drives.

This difficulty is not so serious in vehicles fitted with electric drives, in which it is, of course, possible to fit a separate motor to each wheel. An arrangement of this kind is used in the couple-gear car.

Automatic Differential Locking Gears

The problem of power transmission when one wheel is off the ground, or has no hold, as when in a clay hole or on ice, may, however, be solved in another way. The slipping or free-running of one wheel is due to the fact that the ordinary bevel or spur differential gear is perfectly reversible. If one wheel is jacked off the ground it will revolve at twice the normal speed corresponding to the engine revolutions; and *vice versa*, if the wheel is turned round by hand the engine will make half the corresponding number of revolutions. An attempt made by Hedgeland, about 1905, to solve this problem proved partially successful; but a really practical solution appears to have been found in the worm-gear differential.

The M. and S. differential is of this type. In this arrangement each axle end carries a crown worm wheel of the same hand, each gearing into a worm pinion carried in the differential box; the two worm pinions are geared into an intermediate worm also carried in the differential box. In practice the arrangement of secondary and intermediate worms is duplicated as shown in the figure. The inclination of the teeth is selected so that the worm pinion can be driven by the crown worm wheel, but that the action is not reversible.

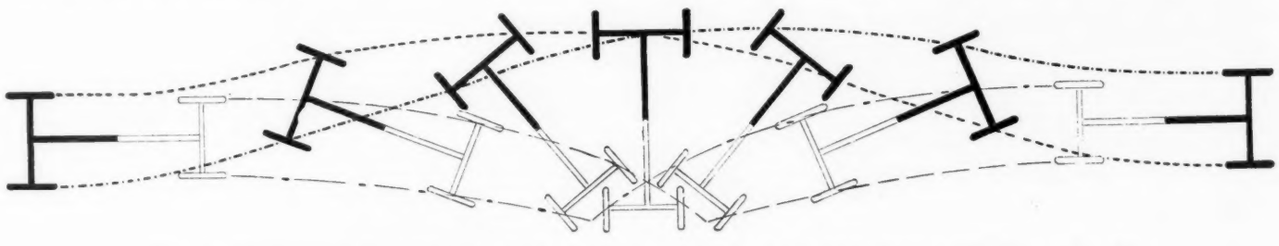


Fig. 4—Diagram of the paths followed by the four wheels of a vehicle during 180 deg. side slip

The Walter automatic differential lock is also a worm-gear differential. In this form the half-axles each carry a crown worm wheel, and as in the M. and S. gear both are of the same hand. Each crown worm wheel engages with a worm pinion carried in the differential box; these worm pinions being both of the same hand are carried on axes, the one of which is advanced in relation to the other at an angle double that of the inclination of the worm pinion thread to its axis. This arrangement eliminates the intermediate worm pinion necessary in the M. and S. gear and thus shortens the overall length.

In this country (England) the problem of the automatic differential lock has been attacked by Wolseley Motors in a different way. In one example small multiple-plate clutches are arranged in the differential box at each side so that they are acted upon by the end thrust of the gears; this end-thrust exists already in the case of bevel or mitre-gear differentials, but in the spur form of differential it is obtained by making the satellite pinions (with axes parallel to the differential axis) alternately right and left-handed worms geared together and gearing respectively with left and right-handed worm wheels, of the same tooth inclination, carried on the respective ends of the axle halves; the end thrust of these worm wheels acts on the multiple-plate clutches in the same manner as in the bevel or mitre gear differentials.

The possibility that the automatic action may not insure complete locking of the wheel or wheels is provided for in a modification of the arrangement. In this form the multiple-plate clutch sleeves carrying the thrusting wheels (whether bevel or worm) are provided with collars against which forked levers pivoted to the differential axle casing can be made to press by means of a hand lever acting through appropriate linkwork. The gear thus forms a partial lock under normal conditions and becomes a complete lock when desired.

Another form of differential locking automatically is the Dorr Miller. This gear consists of the following parts: A central driving plate, eight steel balls carried in holes in the driving plate, two groove blocks with axially-waved races for the balls, and two friction plates, one on the back of each groove block, having one face bearing on the groove block, and the other on the inside of the differential box. As soon as spinning or skidding starts, the groove block which tends to move faster also tends to move away from the central driving plates by the action of the balls in the waved grooves. This action causes the outer surfaces of the groove blocks to bind against the inside surfaces of the friction plates, which in turn tend to bind on the inside of the differential box, thereby converting the differential temporarily into a solid unit. Under normal conditions it is claimed that the rolling of the balls over the waved grooves permits perfect differential action.

It is the author's opinion that it is desirable that comparative tests of the various forms of automatic differenial lock should be made by an independent authority, such as the National Physical Laboratory.

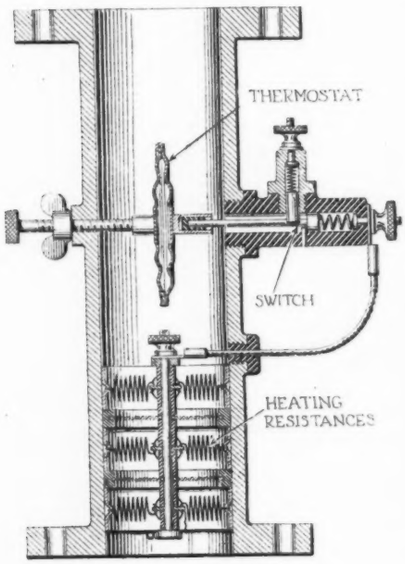
Four-Wheel Drive, Front Steering

The F. W. D. (four-wheel drive) car of Clintonville, Wis., is a four-wheel driven car with front steering, and is fitted with hand-operated differential locks to the central differential. A dog clutch is provided for locking the central differential, and making it inoperative as a balance gear between the two axles. With the central differential locked, one or other of the clutches on the short shafts, which transmit power to the front and back wheels respectively, can be disengaged by the corresponding dog clutch. By this means the vehicle can be converted temporarily into a two-wheel back-drive or front-drive vehicle, as may be best suited to the difficulty requiring the use of the differential lock. Actually two locking gears are provided, one for each end of the differential. For continuous work as a two-wheel drive car the lock is engaged which is next to the shaft that is being used in driving so as to avoid transmitting the locking action through the teeth of the differential gear. The position in which the differentials are placed out of the center of the car is in part constructional, and in part is selected with the object of obtaining greater central ground clearance than would be possible with a central drive.

(*To be continued*)

Scott's Electric Fuel Heater

W. E. SCOTT, a Detroit inventor, has applied for a patent on an electric fuel heater contained in the intake manifold, which is designed to preheat the fuel before it enters the cylinder. The heating apparatus consists of a number of resistance coils and the temperature to which the fuel is heated is controlled by a thermostat.



Section through fuel heater

As will be seen from the section herewith, the heating device is a fabricated structure composed of a number of independent heating units, and the fluid passing through the device impinges against the electrically-heated coils and also against screens or baffles, which are so designed as to prevent the possibility of liquid fuel being carried through the intake unless it strikes against the heated coils. These screens or baffles aid the heated coils in breaking up the fuel and putting it into its most advantageous state for combustion.

The thermostat is located directly in the path of the heated fuel and can be set to maintain the intake gases at any prearranged temperature. It acts by cutting in and out the desired number of heating coils. The ordinary type of carbureter may be used with any fuel which is improved in its combustion properties by pre-heating.

Above the heater and directly in the path of the fuel is a thermostat of the fluid type. It is so arranged that it can be mounted in the intake without making contact with the walls. At opposite sides of the fluid container are members which transmit the motion of the diaphragms to the coil switch, thereby maintaining the desired temperature.

It is claimed that with this arrangement the main supply of fuel may be kept at atmospheric temperature and the fuel then raised to a temperature insuring complete vaporization, by the device described. It is claimed also that the use of the thermostat control makes it possible to provide a uniform mixture regardless of climatic conditions.

WE are in receipt of copies of a number of bulletins issued by the National Safety Council. These constitute an orderly presentation in loose leaf form of accident hazards and the best practices for their elimination. The subjects dealt with in the different bulletins are: Castings, Couplings, Pulleys, Gearing—Engine Guarding and Engine Stops—Oiling Devices and Oilers. Copies of these bulletins can be obtained from the headquarters of the National Safety Council, Chicago, Ill., at 10 cents each.

Boston Show New England Thermometer

Dealers Present in Greater Numbers—Trucks Show Big Gains—Tractors Selling Well—Connecticut Leads Territory in Car Density

BOSTON, March 6—Notwithstanding the intense winter weather which has gripped New England since December, and also the freight embargoes which have stopped car shipments from factories to the six New England States, as well as other handicaps, the annual Boston show of automobiles and trucks gives evidence of very general optimism throughout this section of the country.

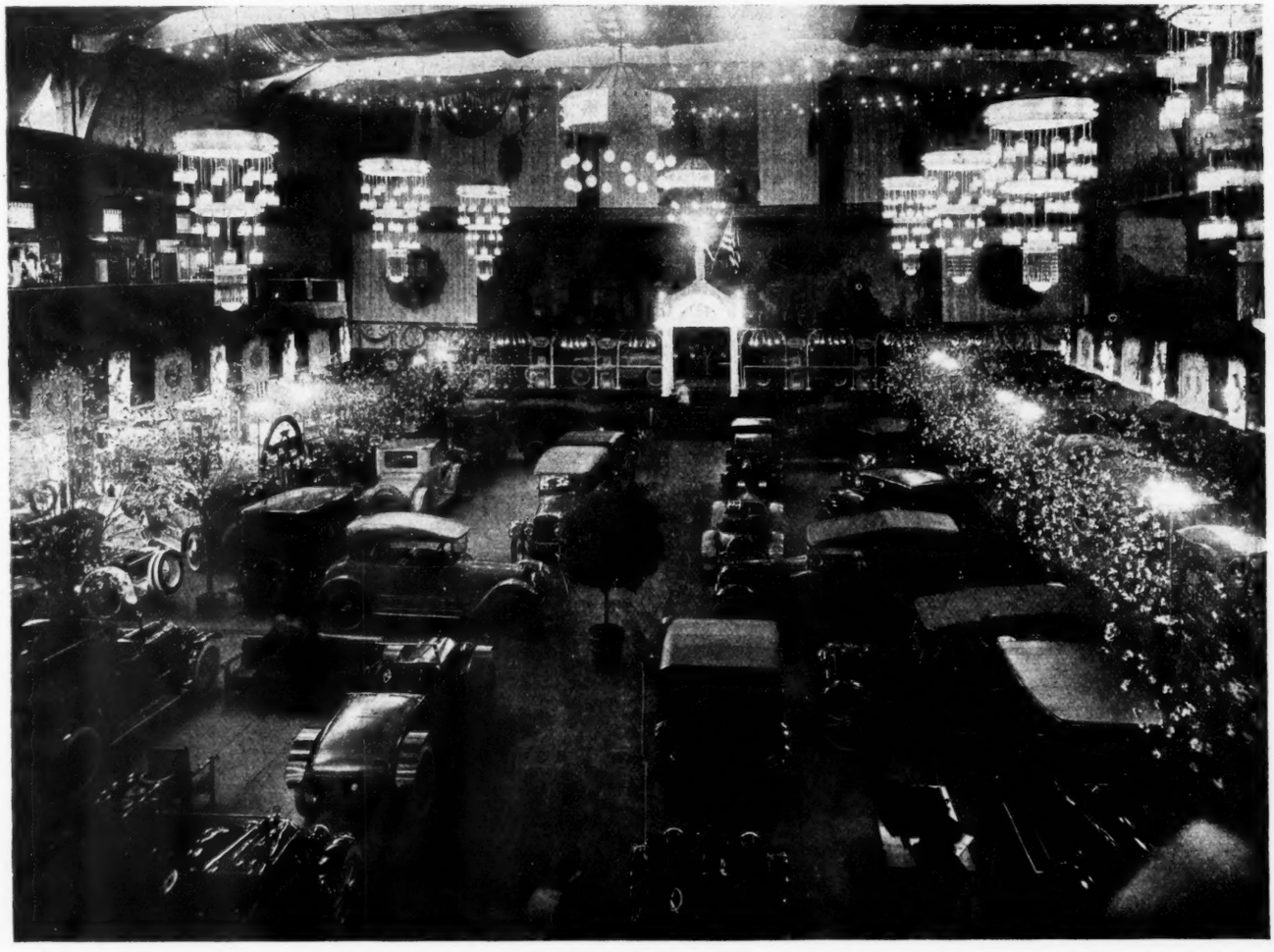
Already more dealers have registered than attended last year, a condition partly due to the excellent propaganda work which the New England distributors have been carrying on for months. The entire section has learned of the show. Posters have been in all of the railroad depots. Show cards for windows have been generously distributed for nearly 2 months, and every means resorted to to get the show injected into every corner of the territory.

This preliminary work was brought to a climax by a meeting of dealers at which over 400 attended. It was a general enthusiasm meeting, in which Alfred Reeves explained the Washington situation and LeRoy Pelletier gave a good talk on advertising in connection with show work.

Boston dealers feel duly proud of the fact that for years they have continued to exhibit motor trucks along with automobiles and accessories, and now that trucks are in such demand the dealers are justified in their consistent handling of the truck during its pioneering period.

Farm tractors are getting started in New England, and approximately 1000 were sold last year in the six States. With the perfection of the small tractor, the New England dealer will very quickly work more and more into the tractor business, just as he has handled the truck line in addition to his automobile sales.

The calendar year of 1917 was not a banner automobile year in New England, due to dealers not being able to get all of the cars they could sell. It is almost impossible to estimate accurately the number of automobiles and



The Boston show has always been a beautiful one, this view showing the peach orchard effect which was obtained in Grand Hall, which housed one section of the passenger cars

One of the aisles in the accessory section of the Boston show which this year was sanctioned by the Motor and Accessory Manufacturers' Association

trucks sold in the year, but from reports from the State secretaries it approximates 58,239 automobiles and trucks. The number of trucks sold during the year approximates 16,000, according to registration returns.

Massachusetts continues the big leader in trucks, and out of a total of 47,592 trucks registered in all New England, Massachusetts has 26,964, Connecticut almost 12,000, Rhode Island nearly 4000, and Maine 3000. Sentiment is general around the show that motor trucks are destined to make great gains in the coming year, that while the increase in 1917 over 1916 was nearly 58 per cent, this figure will be exceeded provided the trucks can be obtained.

The complete automobile and truck census shows on Jan. 1 a motor vehicle for every 22 persons in New England, with Connecticut having the densest vehicle population of one vehicle for every 17 population, as compared with one car to every 24 persons in Massachusetts.

The registration figures for all six States, as of Jan. 1, 1917, and also Jan. 1, 1918, as compiled for the separate States, are given below.

Motor-truck registration figures published herewith give some indication of the growth of that industry.

Increase in Automobile Registration in New England, 1917

		Jan. 1, 1918			Jan. 1, 1917	
	July 1, 1917 Census	Cars and Trucks	Pop. per Car	July 1, 1916 Census	Cars and Trucks	Pop. per Car
Connecticut	1,265,373	74,642	17	1,244,479	56,048	22
Vermont	364,946	18,550	20	363,699	14,251	26
Maine	777,340	38,499	20	772,489	28,951	27
New Hampshire	444,429	18,146	24	442,506	14,338	31
Massachusetts	3,775,973	155,044	24	3,719,156	136,790	27
Rhode Island	625,865	25,142	25	614,315	21,406	29
Totals	7,253,926	330,023	22	7,156,644	271,784	25

Increase in Motor Truck Registration in New England, 1917

	Number of Trucks			Increase, 1915-1916		Increase, 1916-1917	
State	1915	1916	1917	Number	Per Cent	Number	Per Cent
Massachusetts	11,960	18,194	26,964	6,234	52.0	8,770	48.0
Connecticut	4,847	7,759	11,919	2,912	60.0	4,160	58.0
Rhode Island	1,620	2,855	4,065	1,226	75.0	1,210	42.0
Maine	1,000	1,991	3,382	991	99.0	1,391	69.0
New Hampshire	550	*	*	*	*	*	*
Vermont	358	728	1,262	370	103.5	534	73.0
Total	20,335	31,527	47,592	11,533†	76.1†	16,065†	58.0†

*Truck and passenger car registration not separated. †For five states only.

MASSACHUSETTS REGISTRATIONS FOR 6 YEARS

Year	1912	1913	1914	1915	1916	1917	Total Increase Number	Per Cent
Motor trucks	4,087	5,948	8,236	11,960	18,194	26,964	22,877	559
Increase, number		1,861	2,288	3,724	6,234	8,770	Average Increase	
Per cent		45	38	45	52	48	4,575	45

Dope Poisoning

Dangers of Tetrachlorethane in Doping Airplane Wings—Experiences in England and Germany—U. S. A. So Far Immune—Results of Investigations Made Last Summer—British Instruction for Factory Practice—Bureau of Labor Statistics Issues Comprehensive Report

WORKER'S poison in airplane factories among those laborers engaged in putting dope on the wings created such serious difficulties in England and Germany during the early years of the war that in the spring and summer of 1917 the Bureau of Labor Statistics, Washington, D. C., conducted an investigation of the various American factories engaged in this work to learn to what extent dope poisoning or dope sickness existed in this country and has published its findings. Due to the fact that at that time our airplane factories were relatively small, few indications of dope poisoning were discovered and thanks to the attention given to this by our manufacturers, there is little of this trouble present to-day. The situation last summer was so favorable that the Bureau of Labor Statistics declares in its report by Dr. Alice Hamilton that there has been no serious dope poisoning in American factories, and no authenticated case of tetrachlorethane poisoning resulting in toxic jaundice, as the disease has been termed in England, had been reported in this country up to last summer.

The use of dopes in airplane factories is relatively safe providing proper ventilation is furnished so that the poisoning fumes are kept away from the workers. With the great increase in airplane production, which we are at present entering upon, it is more than ever essential that not only adequate ventilation, but all other arrangements necessary in connection with the use of dope should be provided.

Dope poisoning was first heard of in 1913. In that year reports were published in the German medical journals giving accounts of such cases. It appeared in a Johannisthal airplane factory in Germany, and some of the cases proved fatal. It was only a few months later until reports on dope poisoning appeared in the British medical journals. In the early part of 1915 many cases of such poisoning were recorded and during 1916 and 1917 cases were reported, although every effort was made to counteract it.

The poison in dope is not due to the cellulose compound which is the base of the product and may be either the acetate or the nitrate, but is due to the various volatile compounds in which these bases must be dissolved. These solvents in their poisonous work exert their action on the central nervous system, or on the liver, kidney, and heart muscle, or on the constituents of the blood.

The form of poisoning found in British and German shops consists of an acute degeneration of the liver with lesions in kidneys and heart muscle. England calls the disease toxic jaundice.

In the investigation in America eighteen factories were visited, these being situated in Illinois, Michigan, Ohio, Florida, New York, New Jersey, Rhode Island, and Massachusetts. Few of these employed as many as ten dopers. When these investigations were made doping rooms were passably ventilated, considering the amount of work to be

Summary of Investigations on Dope Poison

The main conclusions with regard to airplane dope by the Bureau of Statistics are:

1—In the manufacture of airplanes there is one process which may involve danger of occupational poisoning, the application to the fabric of a water-proofing, tightening mixture, known as dope. This is usually a cellulose compound, the nitrate or the acetate, dissolved in various volatile substances, which are more or less poisonous to human beings.

2—Cellulose acetate dope was formerly made with tetrachlorethane as the principal solvent. It is now made also without tetrachlorethane, dissolved in a mixture of acetone, alcohol and benzol. Cellulose nitrate dope is made with amyl acetate and acetone and usually various alcohols and benzol.

3—Dope poisoning which appeared in airplane factories in 1913 in Germany and England was caused by the presence of tetrachlorethane in the solvent. This poison is very much like chloroform but four times as powerful. Acute poisoning causes drowsiness, confusion, dizziness, sometimes loss of consciousness, or nausea and vomiting and gastric pains. Repeated exposure to the fume causes more pronounced gastrointestinal symptoms and may set up an acute degeneration of the liver with jaundice. This condition, known as toxic jaundice, was the form of dope poisoning which occurred in airplain factories in Germany and Great Britain, and in several instances proved fatal. The British have in consequence recognized such dope poisoning as an occupational disease and have substituted for military and naval airplanes a dope free from tetrachlorethane.

4—The other solvents for cellulose acetate are acetone, alcohols (wood alcohol and grain alcohol) and benzol. These are all volatile and produce, when inhaled or when spilled on the skin, some disturbance of the central nervous system, but none has the effect on the liver and other organs which is exerted by tetrachlorethane. Benzol is the most poisonous and when inhaled in large quantities it may cause death, but in the proportion used in dope solvents such severe poisoning would not be looked for. The milder forms of acute poisoning would be more probable, dizziness, headache, slight symptoms of drunkenness, with excitement or depression, and, if exposure is long continued, symptoms of slow chronic poisoning with anemia, tendency to hemorrhages, and nervous and nutritional disturbances.

5—Acetone is the least dangerous of these solvents; indeed, there is no proof that acetone as used in industry is at all harmful. Methyl alcohol (or wood alcohol) may cause serious symptoms, even when present in small amount, for some people are very susceptible to it. The symptoms of chronic poisoning are much more serious than in chronic poisoning from grain alcohol, and may involve the eyes, causing impairment or loss of sight.

6—Cellulose nitrate dopes contain as solvents amyl acetate, acetone, or other ketones, various alcohols (ethyl, methyl and amyl) and benzol. Amyl acetate has a disagreeable odor and an irritating action on eyes and throat, but so far as is known at present it is not a dangerous poison. Amyl alcohol is said to be more rapid in its effects than grain alcohol and from four to seven times as poisonous.

7—In American airplane works the dopes used until very recently have been chiefly cellulose acetate dissolved in tetrachlorethane, or cellulose nitrate dissolved in amyl acetate and acetone. As cellulose nitrate dope is inflammable and cannot be used on war planes, and as tetrachlorethane is a dangerous poison, a third variety of dope has now come into use, which is made with cellulose acetate dissolved in a mixture of acetone, alcohol, and benzol. In the future it is probable that this dope will be used for war planes, while cellulose nitrate dope will continue to be used on airplanes being manufactured for training purposes.

8—There has been no serious dope poisoning in American airplane works as yet, and no authenticated case of tetrachlorethane poisoning resulting in toxic jaundice has ever been reported in this country. This is probably to be explained by the fact that though tetrachlorethane was used in our fac-

(*Continued on page* 494)

done, but conditions then, so far as ventilation is concerned, were not comparable to the favorable conditions to-day. No doping rooms were seen so small and crowded as to suggest serious poisoning among the workers. The investigation, however, was made in warm weather, and in cold weather different conditions might rule.

The extent to which dope poisoning existed in England and Germany in December, 1913 was such that at the factory in Johannisthal four out of a force of eight workers were affected with a severe type and one died. The dope was applied to the wings by spraying as well as by painting, and the work was done in a poorly ventilated room. This dope consisted of acetate of cellulose in a solvent containing 60 per cent of tetrachlorethane. Tetrachlorethane is an organic substance which contains a high percentage of chlorine. It has come into special prominence of late due to the poisoning conditions surrounding its use unless special precaution is taken.

Reports from Germany show that two commercial dopes contained as much as 84 per cent tetrachlorethane and in experiments consisting of rubbing this into the skins of animals and exposing them to the vapors from it, there developed loss of weight, vomiting, bile and blood in the urine, death with fatty degeneration of the liver, and hemorrhages into serous and mucous surfaces and into the heart muscle. After several days of inhalation by animals these same stages were followed until death. It did not make any matter how the tetrachlorethane was administered. There was in many cases a striking resemblance to delayed chloroform poisoning. Tetrachlorethane has more than seven times the blood-dissolving power that chloroform has.

The danger from tetrachlorethane poisoning where good ventilation is not provided was shown in a German factory in 1914 in which case ten men were poisoned and one died. This person had worked only 2 months with a dope containing 40 per cent of tetrachlorethane. In another factory with fifteen dopers all but one had suffered from the poison and two died within 4 weeks. They were using dopes known as Aviatol and Emaillite.

In another German factory with eighteen cases there were two deaths, the dopes used containing 40, 60, and 84 per cent of tetrachlorethane. After these poison cases two Johannisthal plants gave up using dopes and 4 months later one of the workmen died from poisoning or toxic jaundice. Reports show that men and women who have been away for weeks or months from dope factories have developed cases. After the many German cases the use of tetrachlorethane was forbidden in German factories, but we do not know if this was literally carried out.

Great Britain has had more or less experience with poisoning from tetrachlorethane, her cases being similar to those in Germany. Great Britain's first case was in October, 1914, when a dope worker, after 11 weeks' employment, developed toxic jaundice and died. He was 36 years old. The liver was attacked and was found to be shrunken and green. An inquiry revealed ten more cases of inflammation of the liver in the same airplane factory. The ages of the men were 23 to 58 and the shortest period of exposure before illness was 3 weeks and the longest 16 weeks. Experiments were conducted on animals with the dope and these showed that the poisonous constituent was tetrachlorethane.

The second fatal case in England was a girl of 19 who began work in August, developed jaundice in December, and died Jan. 2. She died with all the symptoms of acute yellow atrophy of the liver. Another girl of 17 years after working 4 months developed a similar case. The third girl, 34 years of age, working through the fall months, developed sickness in December and died early in January. Another case was that of a man 60 years of age reported early in 1916 who died 13 days after consulting the doctor. He had worked barely 3 weeks and began complaining of diarrhea, vomiting and great prostration.

In England in February, 1916, it was known that up to that time forty-three cases of poisoning had occurred followed by seven deaths, five of which were women. Three deaths occurred among tapers.

In the investigation in America some work was conducted by the New York State Industrial Commission in the early part of 1917. Eight factories in New York State were visited, three of which were very small, and the other five employing five, six, seven, twelve and forty-five dopers. An examination of the health was made of fifty-two dopers and it was noted that some disturbance of health was present in thirty-five of these. In some it was very slight, such as a slight anemia, or yellowing of the skin, or reddening of the eyelids. Nine of the thirty-five were so classified. The remaining twenty-six gave histories of symptoms of ill health generally relating to the central nervous system or to the gastrointestinal or urinary system as follows:

Dizziness	14	Vomiting	4
Headache	6	Intoxication attacks	2
Drowsiness	14	Loss of appetite	1
Overcome by fumes	4	Burning of the stomach	1
Semi-conscious attacks	2	Burning micturition	1
Weariness	1	Dark-colored urine	1
Nausea	12	Changes in color of urine	1

Jaundice was observed in two workers and a third gave a history of former jaundice. One of the men with jaundice had dark urine. Almost 1 month previously he was attacked with acute vertigo, syncope. He became nauseated and vomited. All the symptoms except the vertigo lasted 1 day. He suffered a similar attack a week later. On both occasions he remained home and physical examination showed a marked jaundice. This worker was using cellulose nitrate dope, which was free from tetrachlorethane.

In two of the factories tetrachlorethane was used with six men engaged in doping. In the other factory employing sixty-five dopers, nitrate dopes were used with acetone as

Summary of Investigations on Dope Poison (*Continued*)

tories, the amount of dope used was usually small, doping was not continuous, and much of it was done in the open air. Moreover, dopers were continually shifting; not many remained more than a few months in the work.

9—The enormous increase in airplane manufacture in the United States is coincident with a gradual abandonment of tetrachlorethane as a dope solvent, so that we have no reason to expect that toxic jaundice will appear among the dopers in our factories. It is quite possible, however, that there may be more or less serious poisoning from benzol and from methyl alcohol, and it may prove that the other solvents used in nitrate and acetate dopes are not as harmless as we now think them. It is only prudent to assume that such danger is present and to provide carefully for the removal of fumes from doping rooms. The British requirements for artificial ventilation and for the medical supervision of dopers—requirements framed when tetrachlorethane was the solvent used—have remained in force now that the safer dopes have been substituted.

10—American airplane works are at present in process of building or remodeling. In many instances artificial ventilation is being installed; in others only natural ventilation is provided. There is little reason to expect serious poisoning among the users of dopes in these factories, but there will be opportunity for the slow, chronic effects of long-continued exposure to large quantities of amyl acetate and smaller quantities of benzol, wood alcohol, amyl alcohol, etc., among dopers, and this should be prevented by good exhaust ventilation.

Doping should be strictly confined to one building. No other work should be carried on in the room. Dopers should be taught to avoid fumes by starting their work at the end nearest the exhaust vent and working back from there, for in this way the fumes will be continually drawn away from the air they breathe. Medical supervision, with periodic examination of the dopers, is very desirable, since these poisons are comparatively unfamiliar and much valuable information as to their effects on industrial workers could be gained by the foregoing methods.

11—In any factory where tetrachlorethane dopes are used the dopers should be protected not only by a good system of down-draft exhaust ventilation, but by shortening the hours of work, by alternation of doping with outdoor work, and by providing periodic medical examination, with authorization to the physician to suspend from work those who show premonitory symptoms of poisoning.

solvent, or mixtures of acetone and such substance as benzol, amyl acetate, fusel oil and alcohol.

The second case, less markedly jaundiced, had the following history: After one week's work with tetrachlorethane dope he was attacked with dizziness and severe nausea. Symptoms simulating alcoholic intoxication lasted 24 hr. Two weeks later while at work he was overcome for a period of 2 hr. with an attack of vertigo and sleepiness. After 3 weeks more he had a similar attack and again showed symptoms resembling acute alcoholism for about 3 hr. He had highly colored urine at all times. Physical examination showed a slight jaundice. The dope in this instance contained tetrachlorethane.

In studying these cases, it is hard to determine which is the dope solvent responsible for the various symptoms. As we have seen, the characteristic effects of tetrachlorethane are gastrointestinal disturbances and jaundice. Nervous symptoms may also occur. The characteristic effects of solvents used with nitrate of cellulose are found chiefly in the nervous system. Benzol especially may cause a rapidly developing condition resembling alcoholic intoxication. The odor of amyl acetate is nauseating to some men, and both fusel oil and methyl alcohol fumes may cause vomiting, headache, dizziness.

No evidence of serious illness was discovered among these New York workmen, and no case of typical toxic jaundice, such as is described by British and German authors.

Dr. Hamilton's experience, covering three factories in which dopes with tetrachlorethane as the solvent were being used at the moment and in which about 15 dopers were employed, did not reveal any instance of toxic jaundice. The histories related did not even indicate an early stage of this disease; rather the symptoms were those of temporary intoxication and were referable to the central nervous system. Dr. Hamilton also interviewed men who had formerly used tetrachlorethane dope, though at the time they were working with the nitrate. They described cases of poisoning in their own experience or among fellow workmen, but these two were nervous in character, never jaundice with gastric trouble.

In view of the comparative newness of tetrachlorethane in industry it may be of value to describe the symptoms experienced by these dopers who had used it, even if the type of illness from which they suffered was light. Drowsiness, especially in hot weather, was more often mentioned than any other one symptom, and it was most troublesome in the early morning, passing away as the day went on. It was also worse after a holiday, the man having to go again through the process of accustoming himself to the fumes. One doper said that he was always drowsy for a while on starting work, then it passed away, but when he quit and went out into the open air the drowsiness would come over him again. Other men said they would fall asleep as soon as they reached home.

Several men told of having been made faint by the fumes so that they could work no longer that day, but always in these cases there had been some unusual circumstance that had encouraged absorption of the fumes. The room was closed and airless, or the weather very hot and humid. One man had lain down on the floor to paint the under surface of a wing, and thus breathed in the fumes which because of their heaviness always tend to fall to the floor. In another instance described doping was being done in a greenhouse and the men

(*Continued on page* 511)

British Instruction to Avoid Dope Poisoning

THE experience with airplane dope in British factories has resulted in a series of recommendations for the control of doping processes. While these recommendations were framed to protect users of tetrachlorethane dopes, they are still used in airplane works where the use of such dopes has ceased and safer dopes substituted. The following are extracts from Form 356 issued by the factory inspection department of the British Home Office, Februry, 1916:

DOPE POISONING

1—Continued incidence of poisoning in aeroplane factories has led to the addition of the main symptom caused by tetrachlorethane—toxic jaundice—to the diseases which, if contracted in a factory, must be notified to the factory department. The occupier is required to report every such case to the district inspector and to the certifying surgeon, and the medical practitioner in attendance has also to report it to the chief inspector.

2—Not every symptom set up by tetrachlorethane, it should be observed, is reportable. The requirement is limited to the serious sign of jaundice, and in view of its unmistakable character the difficulty of compliance should be small.

3—The size of the aeroplane wings unfortunately makes it impracticable to remove the vapor completely, at the point of origin, by local exhaust which would carry it off without allowing any to pass into the air of the room. Reliance, therefore, in minimizing the noxious effect, has to be placed on dilution of the air so as to keep down the tetrachlorethane and other vapors to a nontoxic proportion. The standard needed for securing this is 30 changes of the air of the doping room per hour. Where this standard has been secured and maintained for all processes in which tetrachlorethane in dope may be used, illness, if not altogether prevented, has ceased to cause serious anxiety. On the other hand, where it has fallen short of 20 changes, toxic jaundice has not failed eventually to show itself, except in the few factories where use of dope has been so intermittent as never to have exposed the workers to a toxic dose.

4—The means of ventilation must be mechanical, preferably by volume or propeller fans with free discharge to the open air. Owing to the high specific gravity of the vapor, the fans should be fixed at the floor level, or below this level where space allows the construction of large ducts under the floor. Air inlets, of the hopper type, the total area of which should be not less than three times the discharge area of the fans, should be provided at the side of the room opposite the fans at a height of about 10 ft. above the floor level. Except, however, where the fresh air is supplied by a satisfactory plenum system, or direct from the erecting shop over a partition of sufficient height, screening the doping room from the rest of the shop, such air inlets may be unnecessary.

5—Owing to varying conditions of construction in different factories, it is impossible to standardize methods of ventilation for doping rooms, but in new works, or extension of existing plants, plans of proposed ventilating arrangements should be submitted to the inspector for dangerous trades, home office, before the work is put in hand.

6—At the commencement of the war, several cases occurred among persons employed in fabric making, erecting fittings, etc., before exhaust ventilation and separation of the process of doping from others was recognized as indispensable. These two conditions have now been secured for doping the wings, but recent experience has shown that insufficient attention has been paid in some factories to the necessity of exhaust ventilation in all processes in which tetrachlorethane dope is constantly used. This applies especially to taping—now sometimes found carried on in the general erecting shop without any precautions—to which operation the three last fatal cases have been mainly due. Notwithstanding the comparatively small amount of dope used the close application required brings the face right into the fumes. And it is the same with the fuselage and other components —struts and landing gear. One attack was traced to the doping on one occasion of especially large wings in the general erecting shop because (it was alleged) the doping room proper could not accommodate them. There was a tendency in some premises before the great development of the industry was fully realized to make the doping room too small. This should be avoided in future construction, but the risk involved by such a procedure as that described makes it incumbent on the occupier to improvise for any exceptional occasion a special exhaust system.

7—Pending the introduction of an efficient substitute for tetrachlorethane, it is most important that occupiers should (in addition to provision and maintenance of a high standard of exhaust ventilation) consider and apply as far as they can the following further suggestions for safeguarding the health of the workers, which are the outcome of experience gained in various works:

(a)—*Exclusion of other work from the doping room.*—The need for this has already been pointed out.

(b)—*Alternation of employment.*—Considerable periods of overtime or long spells in doping or taping have been noted as having preceded some of the fatal attacks. Obviously, as poisoning is a matter of dosage, and the effect of tetrachlorethane is cumulative, the object aimed at by ventilation is defeated if hours of workers are prolonged beyond that for which the ventilation has been designed. In factories where alternation of employment has been arranged, e.g., two days doping and two in other work, or one week in and one week

(*Continued on page* 511)

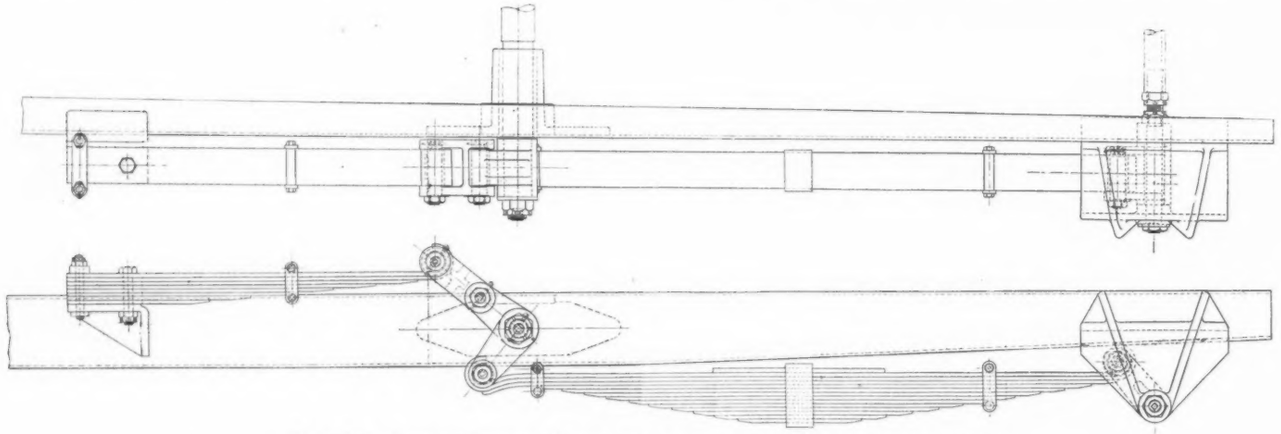
Trott Spring Suspension Absorbs Horizontal Shocks

Introduces Shock Springs Which Take Up Longitudinal Movements of Flexibly Mounted Axles

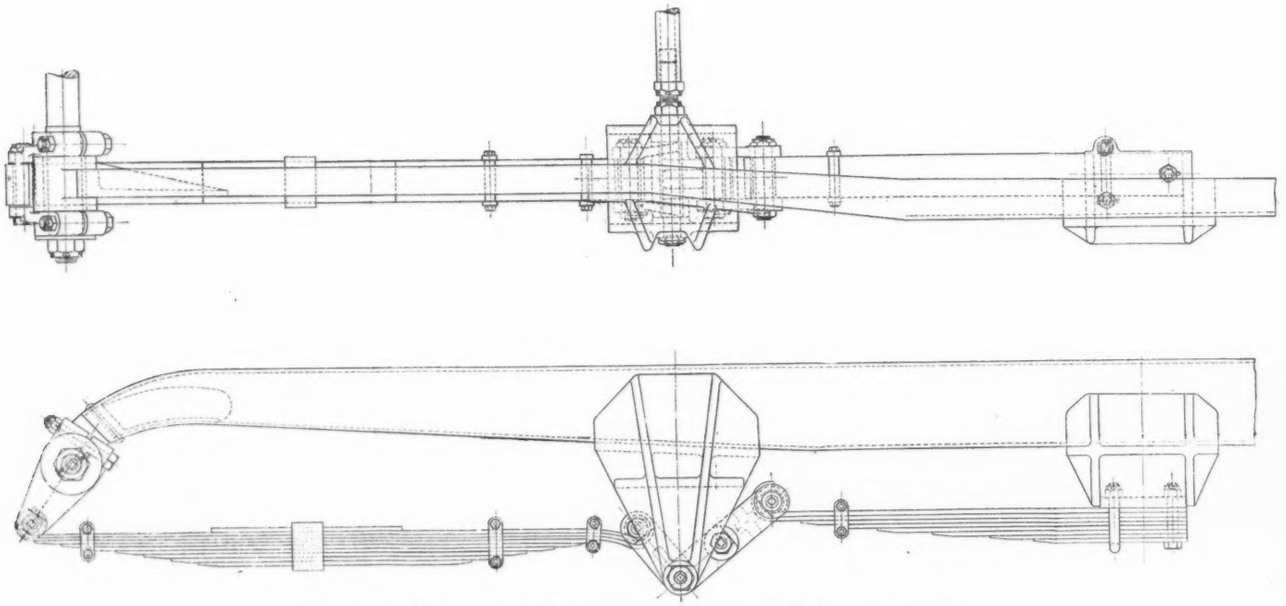
THE Trott Automobile Co. of Detroit has assembled an experimental set of its chassis springs and is sending a car equipped with them over the road from Detroit to Washington, by way of Cleveland, Akron, Pittsburgh and Baltimore. The car, which is a rebuilt White truck, will then proceed down the Atlantic Coast and through the Gulf States to Texas, where the spring suspension will be tested by the government.

The chief object which the designer of the Trott spring suspension had in view was to provide means for absorbing the horizontal component of the shock stresses on the wheels. It is estimated that a 7-in. ditch or shell hole will give a 36-in. wheel a shock with a horizontal component equal to 80 per cent of the total. It is stated that with the conventional spring suspension no attempt is made to cushion the horizontal shocks, although these may do the greatest amount of damage to the truck parts. The ordinary springs do take care of the vertical part of the shock, but it is claimed by the Trott company that nothing is done to cushion the horizontal component, although the entire weight of the truck and load enters into it.

As will be seen from the accompanying drawings, an additional quarter-elliptic spring is inserted, acting as a shock member. This spring is intended to absorb the horizontal components of the shock stresses on the rear wheels. The manner in which this is done may be clearly understood



Drawing showing layout of rear spring suspension by the Trott method



Plan and side view of Trott suspension as applied to front spring

from a study of the drawings herewith. The rear axle member and the spring attached to it are capable of moving backward and forward in a direction parallel with the road. The axle and load springs are so mounted in connection with the shock springs that horizontal movements are against the action of the shock spring. When the truck is standing on a level road the shock springs may be disconnected and the axle will have no tendency to move either backward or forward. The axle, however, may be easily moved in either direction, and when such a movement takes place there will be no tendency for the frame to rise or fall. This is due to the method of pivoting both ends of the rear springs.

Thus, as far as vertical springing is concerned, there is no change in principle or construction to speak of. The shock springs normally are practically unloaded, being just under sufficient tension to give them the correct set. They are designed to operate under both large and small shocks. The shock spring becomes stronger the further back the axle is moved horizontally, so that heavy loads are compensated for by this spring. When the axle is moved back several inches as a result of horizontal shock the shock spring is said to be virtually twenty times as strong as when the axle is moving back 1 in. Thus the desired flexibility over small obstructions and the desired strength against heavy blows are both secured.

The constructon is simple, the rear end of the vertical load spring being shackled and the front end being connected with a bell crank lever. When the rear wheels strike an obstruction tending to move back the rear axle the bell crank is pulled back with the spring and axle, and it in turn depresses the quarter-elliptic shock spring, which absorbs the horizontal stress. At the front axle the same principle of construction is used as in the rear. The front axle connections do not interfere with the cross steering as used on commercial vehicles. The rear axle horizontal movement is taken care of by a longer slip universal joint on the rear axle.

By careful construction of brake centers it is also possible to get satisfactory brake action through a very low-priced linkage. In order to hold the axles horizontal regardless of their movement, cross shafts are employed which hold the springs on both sides of the truck in alignment, so that deflection of the springs on both sides is equal. Thus, when one wheel strikes an inequality the shock spring on the other side also does its part in relieving the blow. This eliminates one-sided strains on the chassis frame.

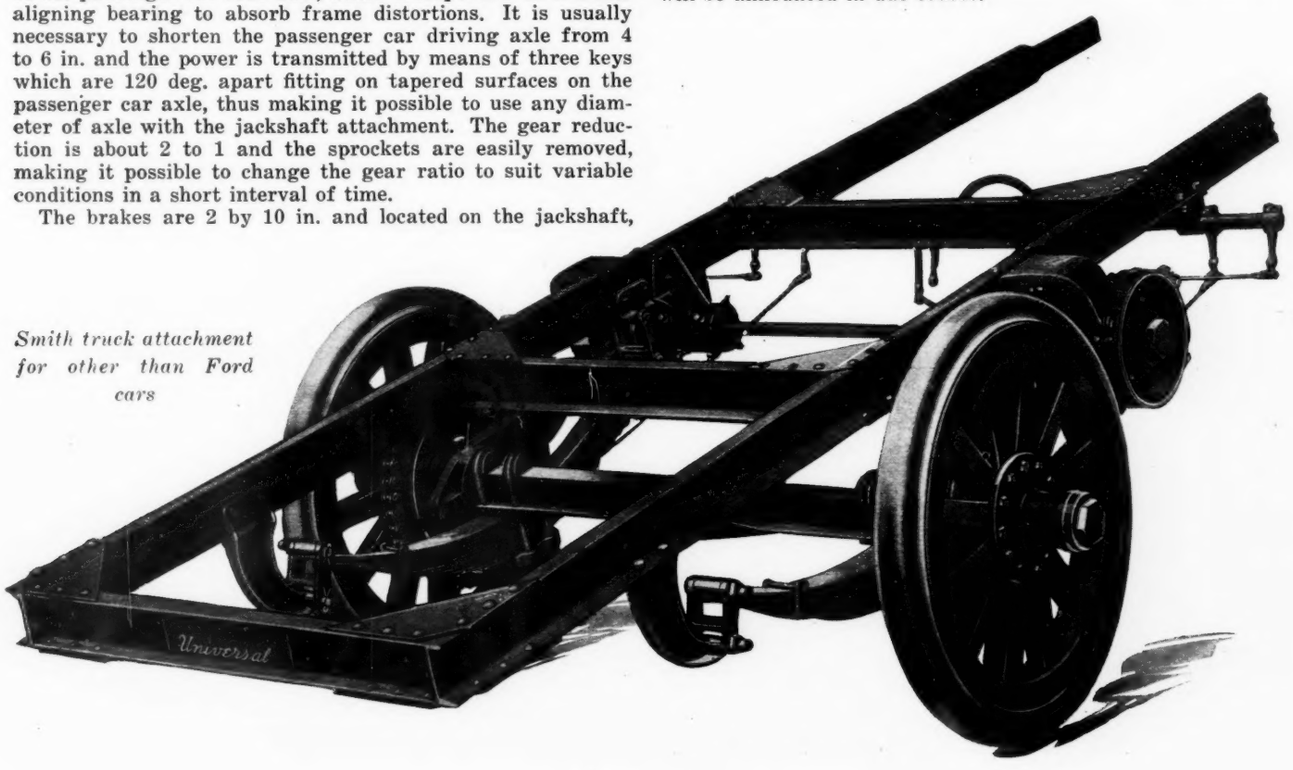
Truck Attachments for Other Than Ford Cars

THE Smith Motor Truck Corp. has brought out a universal Smith Form-A-Truck attachment of 1 and 2 tons capacity which is adaptable to practically every make of chassis except the Ford, for which a standard attachment is made. The 1-ton attachment is recommended for all chassis having engines of less than 260 cu. in. capacity and the 2-ton for all of those having engines larger than this.

The frame is made from 4-in. channel steel, reinforced by a cross member with heavy gusset plates. It is 13 ft. 6 in. long and when attached increases the wheelbase of the car 25 in. This length also provides a loading space of from 9 to 12 ft. back of the seat, depending upon the style of body and the design of car used.

The drive is through adjustable radius rods and not through the springs, which are slung under the dead rear axle. The jackshaft hanger is attached to the frame and to the housing of the passenger car rear axle, which incorporates in it a self aligning bearing to absorb frame distortions. It is usually necessary to shorten the passenger car driving axle from 4 to 6 in. and the power is transmitted by means of three keys which are 120 deg. apart fitting on tapered surfaces on the passenger car axle, thus making it possible to use any diameter of axle with the jackshaft attachment. The gear reduction is about 2 to 1 and the sprockets are easily removed, making it possible to change the gear ratio to suit variable conditions in a short interval of time.

The brakes are 2 by 10 in. and located on the jackshaft, giving ample braking power. The entire attachment is designed so that it can be mounted on a passenger car chassis without any mechanical difficulty. The 1-ton attachment sells for $400 and the 2-ton for $500 f.o.b. Chicago.



Smith truck attachment for other than Ford cars

Encouraging Use of Coal Gas

DURING the past year, since gasoline has become unavoidable for private cars in England, considerable use has been made of coal gas for motor vehicles of all kinds, from omnibuses to motorcycles. To encourage the development of this use the Automobile Association Executive Committee is now offering a prize of £1000 for the best invention which will enable coal gas to be used with advantage as a propellant of motor cars and motorcycles. A small subcommittee has been formed to prepare the conditions, which will be announced in due course.

Early Difficulties with Detachable Heads Now Overcome

Proper Water Distribution and Tight Gaskets Are Chief Requirements—Plugs Must Be Kept Cool

By J. Edward Schipper

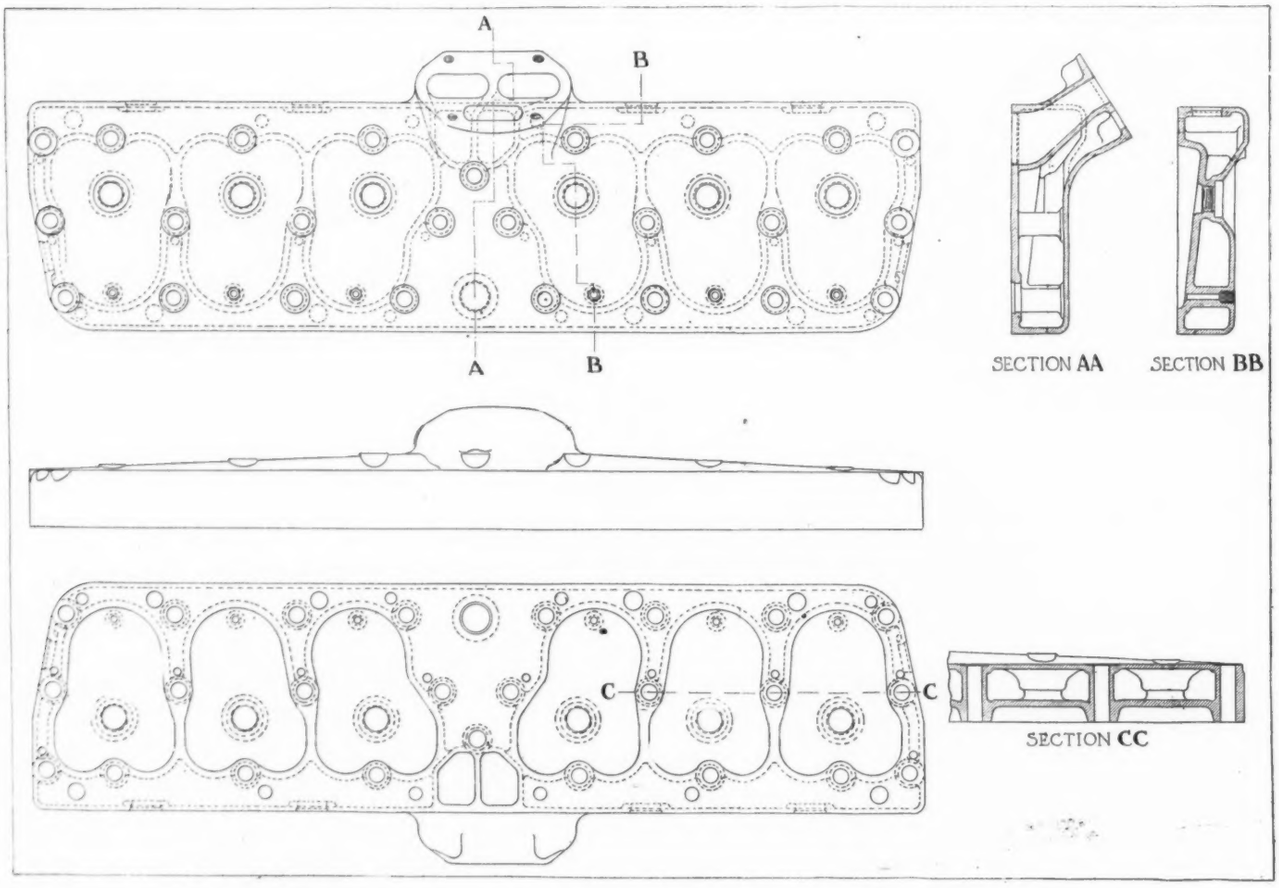
EARLY difficulties with the detachable head have been eliminated to such an extent that there is no indication of any check in the marked tendency toward this construction. Some interesting problems have had to be solved in this connection, and some of the sectional drawings given herewith show the solutions arrived at.

The water around the plugs should be given primary consideration. When this is done the detachable head engine becomes one of the best types that can be designed as far as spark plug life is concerned. The reason for this is, of course, that the water can be brought much closer to the plug than it can be where the spark plugs are screwed into the valve covers.

Many manufacturers on first taking up the detachable head design had the idea that large water passages were necessary between the cylinder and the head. It has been found, however, that the water circulation works out very well with smaller openings, provided they are properly distributed. The objection to large water passages is that they make it quite difficult to prevent water leakage into the cylinder.

Another point is that steam pockets have to be avoided, to which end the water outlet must be located at the highest point of the head. There is an advantage in having the water outlet near the valves, as at this point the water is hottest, and this tends to keep down the formation of steam above the cylinders.

On the Hercules design a different spark plug location has been decided upon from that shown in the drawing. The spark plug is no longer located in the water jacketed head, but is in the port over the intake valve.

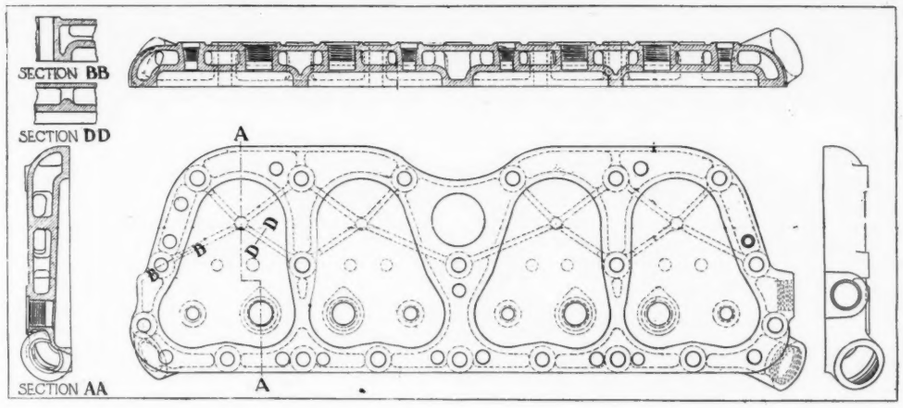


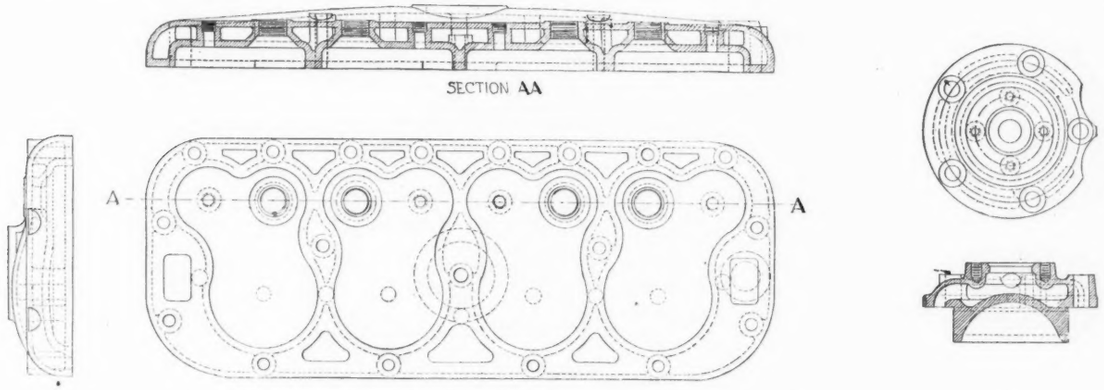
Detachable head employed on the Packard Twin-Six engine, showing water passages

Right—Detail drawing of the detachable head on the Cadillac eight-cylinder engine

Below, right—The Hercules Motor Mfg. Co. employs an independent head for each cylinder

Below, left—Detachable head casting employed by the Wisconsin company showing location of spark plugs and studs, together with water jacket





It is the opinion of the Hercules company that the plugs should be in the head, with the water circulating all the way around the boss into which the stem of the spark plug screws. This idea will be incorporated in the new Hercules design.

The early difficulties with detachable heads were by no means all in connection with the cooling system. One of the points which had to be cleared up was the proper method of installing studs. If there was insufficient metal around the studs the head would often be thrown out of shape, with the result that the gaskets would leak or other trouble result. In case the studs were placed too near the valves, the valve seats would become distorted by the tension on them, with the result that it was difficult to keep the valves tight. By careful watching the water space stud location and the amount of metal around the studs so as to insure that the stresses contingent upon tightening the studs will be properly distributed, a successful detachable head design is secured. Furthermore, an advantage accrues from the close approach to the ideal or hemispherical form of combustion chamber. This means that the wall area, as compared with combustion chamber volume, is a minimum, which tends toward increased thermal efficiency by reducing jacket losses.

From a manufacturing standpoint, a well designed detachable head offers an attractive proposition. In the first place, it results in an open-ended cylinder which is far easier to handle than a closed type, besides being easier to cast. It is also possible to machine the combustion chambers all over and to secure greater accuracy in combustion chamber volume.

Fluxes for Melting Aluminum Scrap

THE fluxes commonly used in melting aluminum scrap, says the *Brass World*, are fluorspar, cryolite, and salt. An excellent way of utilizing such material when a part of the scrap is small and not clean is first to melt a bath of aluminum, using solid material, and to allow it to reach a temperature of approximately 850 deg. C., then add the sweepings, etc., in such quantity that the bath will absorb them without losing its liquidity. The bath is then reheated and more scrap charged, the process of charging and reheating being alternated until the crucible is as full of metal as desired. The metal will most likely be pasty, and a small piece of fused zinc chloride is added and the bath well stirred. The resulting action will free the mixed oxides, and the metal will assume its natural fluidity. The crucible should be immediately emptied of aluminum before any reaction can occur between the metallic aluminum and the heated oxide on the one hand and the oxygen and nitrogen of the atmosphere on the other, as such reaction will consume metallic aluminum and greatly reduce the percentage recovered.

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IT is said to be the intention of the British Air Board to stimulate output of aircraft engines by reducing the number of standard types to not more than four. At the same time care will be taken that the march of improvement will not be unduly obstructed by overemphasis of the importance of output rate. The Royal Aircraft factory is to be devoted exclusively to experimental work, but such work is not to be confined to this one establishment, as it is considered all important that several totally independent centers of thought should be at work on the improvement of aircraft.

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FROM the Engineering Experiment Station, University of Illinois, copies have been received of two bulletins issued by the Station and covering experimental work done by it. One is entitled "Tests of Oxy-acetylene Welded Joints in Steel Plates" and the other "The Collapse of Short, Thin Tubes."

The Most Economical Size of Tractor*

An Analysis of Costs of Power Plowing with Tractors of Different Sizes, Taking Account of Labor Cost, Cost of Fuel and Repairs, Depreciation and Interest on Investment

By E. Goldberger
Efficiency Engineer, Packard Motor Car Co., formerly Assistant Chief Engineer, Holt Mfg. Co.

A COUPLE of years ago a study of the cost of plowing with tractors would not have been of any practical value, since the conclusions, even though they might have been drawn in the most logical way, would have been based upon theoretical assumptions, hence the conclusions too would have been theoretical.

During the last few years the line of tractors has been extended, till now we have on the market tractors of practically any size between 10 to 130 hp. From their performance and prices and from the requirements on the farm and the manufacturing problems—all known factors—it is possible not only to draw correct conclusions regarding present conditions, but also to anticipate future developments, which, from a business standpoint, are more important.

Many students of this problem will undoubtedly say conditions on the farms are so different as to the quality of soil, size of farm, kind of crop and hundreds of other things that, considering everything that enters into the problem, a general and intelligent solution of it is precluded, while without taking everything into consideration the solution cannot be correct. That is as it appeared to me a couple of years ago, but I have changed my mind in the meantime.

One way of attacking the problem is by a "national referendum" *i.e.*, by asking every tractor owner the size of tractor and farm he has, perhaps also the size of tractor he thinks would suit him better, and draw the conclusion according to the law of averages. The Department of Agriculture has published in book form the results of such an investigation directed by A. P. Yerkes, and it is of interest to note that although following different methods, the results of the survey agree with the conclusions which follow the thought of this study.

In the following, I shall consider three sizes of tractor that would be built along exactly the same standards of quality, design and workmanship:

A—Capable of pulling two 14-in. plows, 6 in. deep, in average soil, at a speed of 2½ m.p.h. This would require about 9 hp. on the drawbar.

B—Same quality tractor, of double size, pulling four 14-in. plows, 6 in. deep in the same soil, 2½ m.p.h. speed. Drawbar of 18 hp.

C—Twice as strong as B, pulling eight 14-in. plows, 6 in. deep in the same soil. Drawbar 26 hp.

Price

Since there is to-day no doubt in the mind of anybody familiar with the tractor problems that really successful tractors are and have to be built according to the standards of quality adopted by the truck manufacturers and not those of the country blacksmiths, I shall estimate the prices as follows:

Tractor A, $600; tractor B, $1,500; tractor C, $3,600. The price for tractor A if the design, material and workmanship be first class, cannot be reached unless quantity-production methods are adopted. For 100 per cent increase in size, the price increases 150 per cent in the above estimates, since I make the preliminary assumption that with the size of the tractor increasing, the demand might decrease and the manufacturing methods to be adopted become more expensive.

I shall not consider the cost of plows and other equipment, since for a comparative study of the cost of plowing with different sizes of tractors it matters very little.

A two- and a four-bottom tractor and plow can easily be operated by one man, while for an eight-bottom tractor two men are necessary, not for lifting and lowering the bottoms, which can be done automatically, but for cleaning and unclogging the plows, which would mean stopping the machine often if it were expected to be done by the man steering the tractor.

The expense for operator would therefore come to 30 cents per hour for the two- and four-plow outfit and 60 cents for the eight-plow outfit.

Experience has shown that the fuel consumption of gaso-

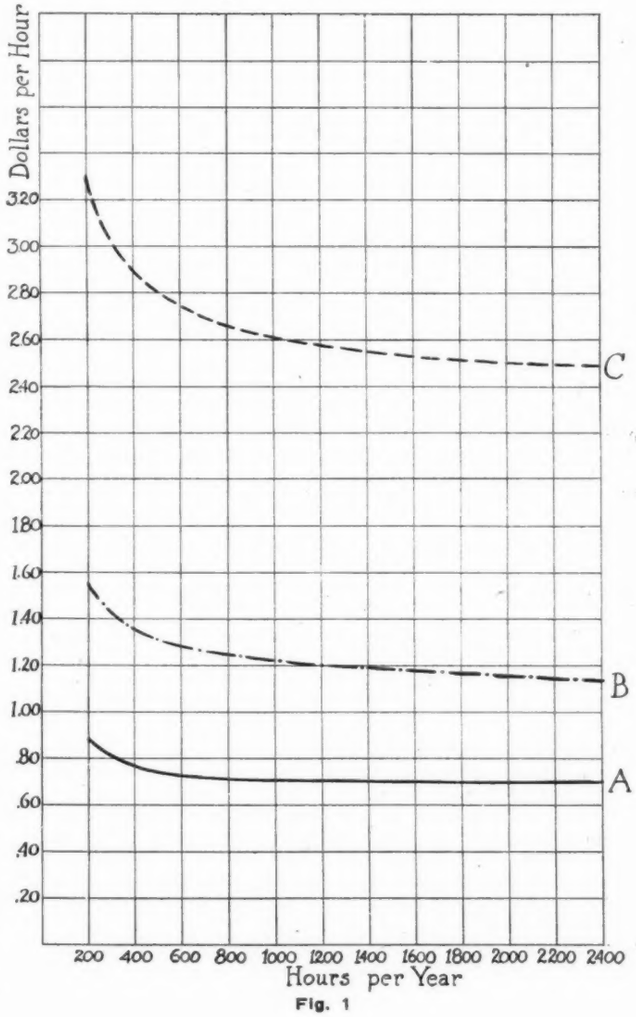

Fig. 1

*Presented to the Mid-West Section of the S. A. E. at its meeting at Chicago on Feb. 21.

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line tractors per hp.-hour changes little or not at all with the size of motor, provided all are built according to the same standards and are run at the same percentage of load. In our case the cost for fuel (and oil, etc.) should be for tractor A, 25 cents per hour; tractor B, 50 cents per hour, and for tractor C, $1 per hour.

Depreciation

One often hears the statement that a tractor will last 5 or 6 years. Such a statement is fundamentally wrong. There are two reasons why a tractor, or any machine in general, depreciates; first, wear and tear of the machine, a factor which is altogether independent of its age, the only thing affecting it being the actual working hours; and, second, obsolescence, which on the contrary, depends upon the age of the machine and not upon the working hours. The last factor is more important than the first in automobiles or any products subject to change of style, but, with utility products, it has little importance, unless a new invention changes fundamentally the existing conditions. Yet, even among automobiles, the Ford car, model T, has not become obsolete after 10 years of use, and I know of American tractor manufacturers who have not improved their tractors materially since 1911-12 and are now selling more tractors of the same type in a month than they made all told up to 1915, while some of the machines they sold in 1912 are still going strong. Therefore, it is appropriate to base the allowance for depreciation upon the total actual working hours of a tractor, provided it be of progressive design, and not upon total life. This should apply satisfactorily to horses or any draft animals whose average life is nearly constant whether they work or not. It is a conservative estimate to say that tractors of modern design of any size have a useful life of about 4500 hours of plowing, which would give a tractor, plowing 10 hr. a day, a life of 5 years. Should the tractor plow only 45 days per year its life would figure out at 10 years, provided no other work is done. This estimate is safe since 90 per cent of its value has already been figured in the item for wear and tear, and part of the remaining 20 per cent can easily be recovered from the sale of its high-grade material as junk.

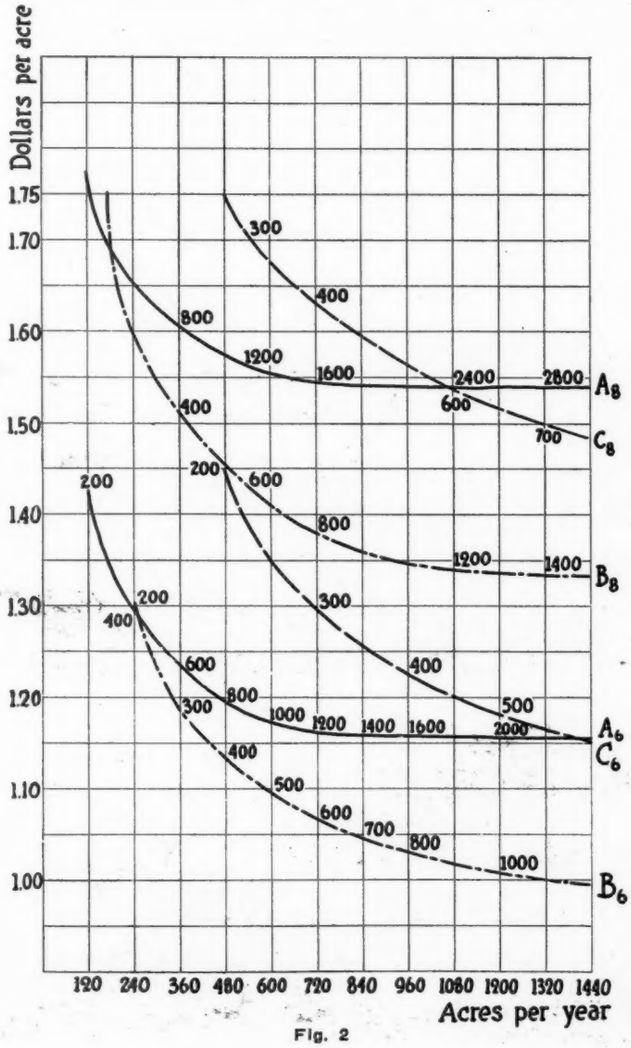

Fig. 2

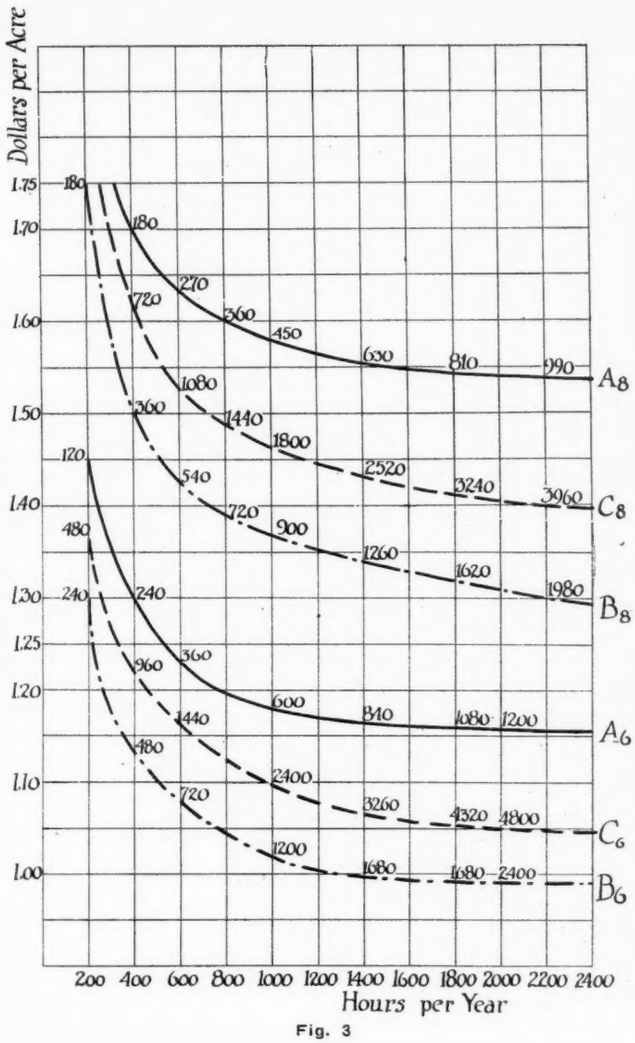

Fig. 3

The amount of depreciation per plowing-hour figures out to

$$\frac{600}{4500} = \$0.13 \text{ for tractor A.}$$

$$\frac{1500}{4500} = \$0.33 \text{ for tractor B.}$$

$$\frac{3600}{4500} = \$0.80 \text{ for tractor C.}$$

Repairs and Interest

These two factors are considered together and estimated at 6 per cent per year on the initial price of the tractor. Since the value of the tractor decreases constantly, the interest on it also decreases. Suppose the life of the tracor to be 6 years, then the interest during the first year will be 6 per cent on the price paid; the following year it will be 6 per cent on the actual value of the tractor, or 5 per cent on the initial price, and so on. The allowance for interest and repairs being 6 per cent per year on the initial price, it results that no repair allowance is made for the first year, 1 per cent of the initial value for the second year, 2 per cent for the third year and so on, an estimate which conforms to conditions encountered with tractors of modern design.

Suppose we calculate every one of these items for each of

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the three sizes of tractors chosen, for different numbers of plowing hours per year. Graph 1 is based on these figures, the horizontal scale representing the number of plowing hours per year and the vertical scale, the cost of plowing per hour. Curves A, B and C correspond to the machines mentioned.

Graph 1 does not give directly the comparative costs of plowing with the different sizes of tractors, but is used for making graphs 2 and 3. Graph 3 gives the cost in dollars per acre, varying with the hours of plowing. Tractors A, B, and C are supposed to pull 2, 4 and 8 bottoms, 14 in. wide and 6 in. deep, at a speed of 2.5 m.p.h. It is assumed that the tractors will plow only 85 per cent of the time they are in the field, 15 per cent being allowed for turning the headlands, oiling, trouble, etc. The area actually plowed per hour then figures out to 0.6, 1.2 and 2.4 acres respectively. The small figures along the curves give the number of acres per year the respective tractor will plow.

With graph 2 as a basis, graph 3 has been drawn, and this gives the information we are after. We read the area to be plowed in a year on the horizontal axis, follow the vertical through this point, until it intersects with the curve representing the A, B, or C tractor, and then pass horizontally to the left where we read on the vertical axis the cost of plowing per acre. The figures along the curves represent the number of hours the tractor will have to work in order to perform the work expected. Recalling that A, B and C represent tractors plowing 8 in. deep, let us now consider the significance of graph 3.

If we have to plow less than 250 acres per year and not deeper than 6 in., the tractor with 9db-hp. plows the cheapest, while for anything above this amount of plowing the 4-plow tractor with about 18 db-hp. is cheapest in the end. Even for farms so large that one 4-plow tractor is too small, it pays better to have two 4-plow tractors than one 8-plow tractor. The advantage of having two smaller units instead of one large one, due to the flexibility and reduced chance of complete tie-ups, due to breakdown, etc., is not considered at all in the chart.

The chart shows much more than this. It shows how much cheaper the plowing comes if there be much of it, or, in other words, how expensive it is to be poor. There are, however, two ways enabling the small farmer to meet the competition of the big one, without having to buy his neighbor's land. They consist in plowing deeper and in plowing early and quick. To enable him to do this he will decide on a 4-plow tractor rather than on the smaller size. In fact, we find from the upper curves that represent the cost for plowing 8 in. deep that for over 180 acres of plowing per year the 4-plow tractor is the cheapest. While for 240 acres of plowing per year the 4-plow tractor figures only a little cheaper in dollars and cents, it has the advantage that it performs the work in about 30 days instead of 60, as is necessary with the smaller one.

Now, there are two ways of making a tractor intended to pull 4 bottoms, 6 in. deep, plow 8 in. deep. The first is to hitch to it 3 plow bottoms instead of 4; and the second to plow with 4 bottoms, but at lower speed, about 1.9 m.p.h., instead of 2.5 m.p.h. Every tractor should have the two speeds mentioned. The areas plowed per hour by the two methods and the costs are nearly the same. One great advantage of the first method is that we have a low-speed gear in reserve for hard spots on the land, or grades. On the other hand, with a 2-plow tractor, intended for 6 in. deep plowing, we have no other choice—if extra expense for specially narrow bottoms is to be avoided—than to run the plows 8 in. deep on low speed all the time.

Manufacturers have too long likened tractor manufacturing problems to truck problems. There are good reasons for building 4 or 5 sizes of trucks in the same plant. A 5-ton load sometimes cannot be handled by either one or two 3-ton trucks and it is not economical to run a 3-ton truck with a 1-ton load; but in plowing the load can be easily adapted to the full power of the tractor.

It is important to note that the above conclusion has been reached although the preliminary assumption was made that the 2-plow tractor would probably be the most popular type, and therefore the cheapest to manufacture. But since we have reached the conclusion that the 4-plow outfit is the most economical it is reasonable to conclude that, owing to its production in large quantities, its cost per horsepower will not be 25 per cent higher than that of the 2-plow outfit, as assumed at the start of this analysis, but perhaps even lower.

Scenes from the Flying Fields in France

THE photographs show views from the training headquarters of the American air forces in France. In the upper picture is seen a Nieuport monoplane, said to be one of the fastest scouting machines in existence, which has been loaned by the French Government to the American air service. In the lower view are shown the provisions for refilling the tanks of the flying machines.

These photographs are copyrighted by the Committee on Public Information.

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The Benz 230-Hp. Aircraft Engine

Part III

Weights of Component Parts—General Data and Dimensions — Analyses of Materials of Construction — Test Results of the Engine

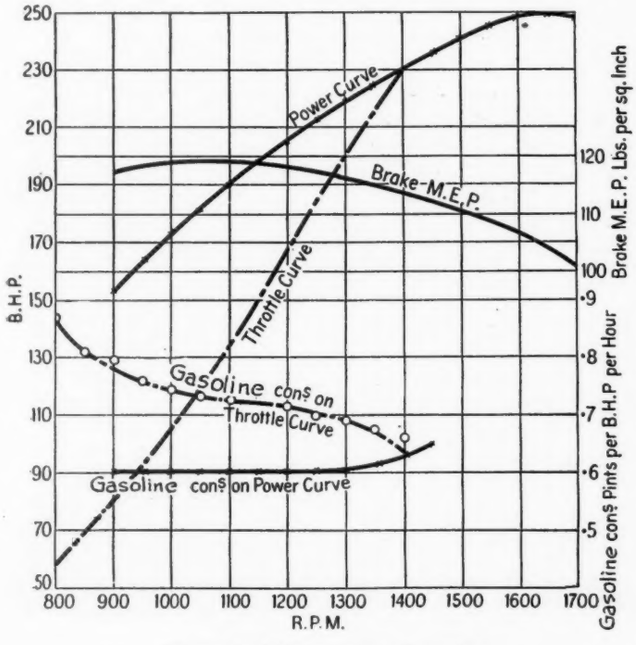
THE following data relating to the 230-hp. Benz engine were obtained from a test carried out at the Royal Aircraft Factory, and the power, throttle and consumption curves as shown resulted.

The engine, which was coupled to a Heenan and Froude water dynamometer, was run up to 1700 r.p.m., the peak of the power curve occurring at 1650 r.p.m., at which 250 hp. was developed. The maximum brake m.e.p. reached 119 lb. per sq. in. at 1100 r.p.m. The test was of one hour's duration.

R.P.M.	1400
B.H.P.	229
Gasoline consumption	150 pints
Oil consumption	4.5 pints
Water inlet temperature (average)	62° C.
Water outlet temperature (average)	71° C.
Oil temperature (maximum)	50° C. steady
Oil pressure (minimum)	28 lb. sq. in. steady

The following is a list of weights of various parts of the engine:

	Lb.
Cylinders, complete, including supports for rocker levers (six at 44.25 lb. each)	265.5
Pistons, complete, with rings and piston pins (six at 7.62 lb. each)	45.72
Connecting rods, complete (six at 7.13 lb. each)	42.78
Valves and springs, complete (twenty-four at 1.14 lb. each)	27.36
Tappets, push rods, and rocker levers (twelve sets at 3.2 lb. each)	38.4
Induction pipes, complete (two at 2.625 lb. each)	5.25
Carbureters, complete (two at 6.54 lb. each)	13.08
Crank chamber, top half	103.25
Crank chamber, bottom half (including cylinder studs and oil pump shaft)	110.25
Crankshaft, complete	109.25
Propeller boss, complete	19.32
Camshafts, complete, with bearing, less gear wheels (two at 8.25 lb. each)	16.5
Magnetos, complete (two at 10.75 lb. each)	21.5
Ignition wiring, complete (two at 2.12 lb. each)	4.24
Water pump, complete	8.75
Oil pump, complete	2.89
Fuel pump, complete	6.75
Exhaust manifold	15
Miscellaneous parts	7.53
Total weight of complete engine	863.32

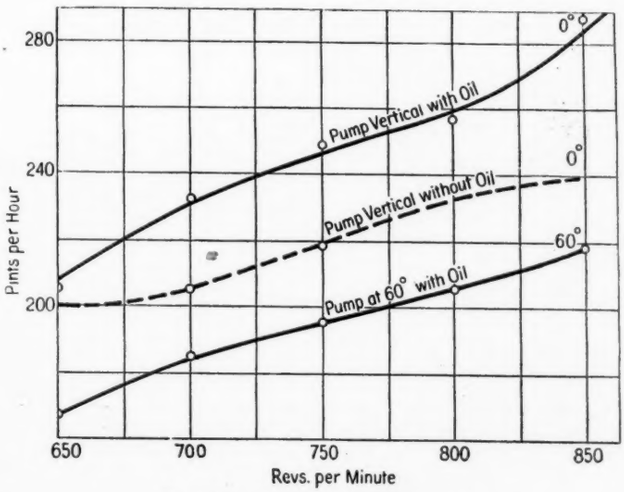


Characteristic curves of engine

General Data and Summary

The following general data and summary are furnished by the naval and military authorities:

Number and arrangement of cylinders.	Six vertical
Bore	145 mm. (5.71 in.)
Stroke	190 mm. (7.48 in.)
Stroke/bore ratio	1.31-1
Stroke volume of one cylinder	3137.476 cu. cm. (191.386 cu. in.)
Total stroke volume of engine	18824.856 cu. cm. (1148.316 cu. in.)
Area of one piston	165.13 sq. cm. (25.59 sq. in.)



Results of tests of fuel pump

Total piston area of engine	990.78 sq. cm. (153.57 sq. in.)
Clearance volume of one cylinder	796 cu. cm. (48.66 cu. in.)
Compression ratio	4.91-1
Normal B.H.P. and speed	230 B.H.P. at 1400 r.p.m.
Piston speed	1744 ft. per min.
Brake mean effective pressure	113 lb. per sq. in. at 1400 r.p.m.; 119 lb. per sq. in. at 1100 r.p.m.
Cu. in. of stroke volume per B.H.P.	4.99
Sq. in. of piston area per B.H.P.	.667
H.P. per cu. ft of stroke volume	346.3 h.p.
H.P. per sq. ft. of piston area	215.9 h.p.
Direction of rotation of crank	R.H.T.
Direction of rotation of propeller	R.H.T.
Normal speed of propeller	Engine speed
Lubrication system	Forced to main bearings from reservoir in sump.
Brand of oil	50 per cent Vacuum Heavy and 50 per cent Sternof
Oil pressure	28 lb. normal, 50 lb. max.
Oil temperature	50° C., max.
Oil consumption per hour	4.5 pints
Oil consumption per B.H.P. hour	.02 pint
Specific gravity of oil	.9
Type of carbureter	Two Benz each feeding three cylinders (two-jet)
Mixture control	Automatic
Fuel consumption per hour	150 pints

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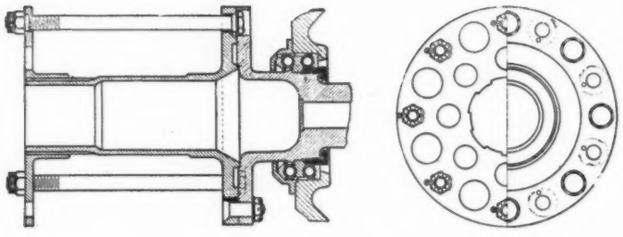


Propeller hub construction

Fuel consumption per B.H.P. hour	.65 pint
Specific gravity of fuel	.720
Type of magneto	Two Bosch Z.H.6
Firing sequence of engine	Prop.: 1, 5, 3, 6, 2, 4
Numbering of cylinders	Prop.: 1, 2, 3, 4, 5, 6
Speed of magneto	Two-thirds engine speed
Direction of rotation of magneto, facing driving end of armature	Anti-clockwise
Magneto timing	30° E. 18 mm. on stroke
Inlet valve opens. Deg. on crank	10° E.
Inlet valve closes. Deg. on crank	55° L.
Maximum lift of inlet valve=h	11.8 mm. (.465 in.)
Diameter of inlet valve=d (smallest diameter)	Two of 52 mm.
Area of inlet valve ports=$\pi \times d \times h$	19.27 sq. cm. each
Mean gas velocity through inlet valve	124 ft. per sec.
Clearance of inlet tappet	.009 in.
Exhaust valve opens. Deg. on crank	60° E.
Exhaust valve closes. Deg. on crank	20° L.
Maximum lift of exhaust valve=h	11.25 mm. (.443 in.)
Diameter of exhaust valve ports = d (smallest diameter)	Two of 52 mm. diameter
Area of exhaust valve ports=$\pi \times d \times h$	18.37 sq. cm. each = 2.84 sq. in.
Clearance of exhaust tappet	.015 in.
Direction of rotation of revolution counter-drive, facing driving shaft on engine	Anti-clockwise
Speed of revolution counter-drive	½ E.S.
Weight of engine, complete with propeller hub, less water, fuel, and oil, and exhaust manifold	848.32 lb.
Weight per B.H.P., ditto	3.68 lb.
Weight of exhaust manifold	15 lb.
Weight of oil carried in engine	18 lb.
Jacket capacity of one cylinder	1873 c.c.
Weight of water carried in engine	30.9 lb.
Weight of radiators, less water	136 lb.
Weight of fuel per hour	135 lb.
Weight of oil per hour	5.06 lb.
Total weight of fuel and oil per hour	140.06 lb.
Gross weight of engine in running order, less fuel and oil. Cooling system at .65 lb. per B.H.P.	996 lb.
Weight per B.H.P., ditto	4.33 lb.
Gross weight of engine in running order, with fuel and oil for six hours. Tankage reckoned at 10 per cent weight of fuel and oil	1920.89 lb.
Weight per B.H.P. with fuel and oil for six hours	8.35 lb.

Analysis shows the chemical composition of the various parts to be as appended below. The analysis of gear wheel and camshaft were made on drillings taken from the cores, as these were case-hardened parts:

ANALYSIS OF MATERIAL

	Carbon %	Silicon %	Sulphur %	Phosphorus %	Manganese %	Nickel %	Chromium %
Water jacket	0.07	0.03	0.046	.0027	0.35	Nil	0.02
Crankshaft	0.13	0.31	0.026	.0014	0.48	3.21	0.87
Connecting rod	0.15	0.21	0.027	.0026	0.37	4.02	1.21
Gear wheel	0.23	0.25	0.014	.0027	0.53	3.58	0.81
Camshaft	0.14	0.23	0.029	.0026	0.95	4.68	1.48
Inlet valve	0.26	0.28	0.012	.0020	0.40	5.36	1.06
Valve spring	0.40	0.02	0.033	.0085	0.55	Nil	0.01

	Graphitic Carbon %	Combined Carbon %	Silicon %	Sulphur %	Phosphorus %	Manganese %
Cylinder	1.90	0.77	1.68	0.122	0.176	0.48
Piston	1.85	0.50	1.46	0.130	0.210	0.77

	Graphitic Silicon %	Combined Silicon %	Iron %	Tin	Copper %	Zinc %	Lead	Aluminium %
Crank case	0.18	0.89	0.93	Trace	6.20	9.59	Trace	82.21 by diff.

	Antimony %	Tin %	Copper %	Lead %
Bearing metal	11.95	78.57	8.10	0.90

Mechanical tests gave the following results:

	Yield Point, Tons Per Sq. In.	Ultimate Stress, Tons Per Sq. In.	Elongation %	Reduction of Area %	Impact Ft.-lb.
Crankshaft	55.2	62.5	21.3	59.75	26
Cylinder	....	8.36	Nil	Nil	..
Connecting rod	41.9	48.1	14.0	....	..
Crank case		8.91	....	....	..

Female operatives in the plant of the Briggs-Stratton Co., Milwaukee

New S. A. E. Aircraft Standards

Fourth and Last Installment

S.A.E. Aeronautic Engine Testing Form

Specification Sheet Outline

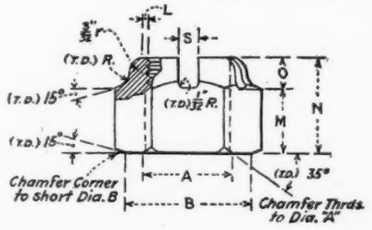
Name and Model..... Date of Test.....
Manufacturer .....

(All dimensions to be given in inches.)

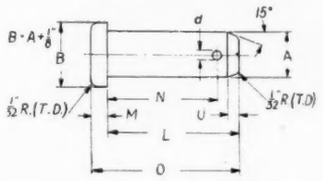
(1) General Type..... Cycle.....
(2) No. of Cycle..... Bore..... Stroke.....
Piston Displ. per Cyl.....cu. in. Total.....cu. in.
(3) Compression Vol. (V_c).....cu. in.
Total Vol. of Cyl. (V).....cu. in.

$$\text{Compression Ratio} = \frac{\text{Comp. Vol.}}{\text{Total Vol.}} = \frac{V_c}{V} \text{ Compression}$$

Pressure .....lb. At .....r.p.m.
(4) Type of Cyl..... Matl.....
(5) Type of Valves..... Location.....
(6) Cooling System..... Type of Pump.....
Capacity.....lb. per min. at.....Eng. r.p.m.
Weight of Water in Cyl. Jackets.....
Water Space bet. Jacket and Cyl. Top.... Bottom....
(7) Piston, Type..... Matl.....
Wgt. without Pin and Rings... With Pin and Rings...
Distance from center of Pin to top of Piston.....
Length, over all.... Clearance Main Body.... Top....
Length Piston Clearance at Head.....
Length relieved portion at Center if any.....
(8) Piston Rings, No. per Piston.... Type.... Width....
(9) Connecting-rod Type..... Matl.....
Length, c. to c..... Weight, Upper end.....
Lower end..... Total.....
No. Bolts in lower end..... Dia. Bolts.....
Matl..... Weight complete with Bearing.....



Clevis Pins



Edges of *d* chamfered not to exceed 0.01 in. T. D. indicates tooling dimension.

A	Limits of A	B	M	L—N	U	d Drill No.	Cotter Pin
1/8	0.123 0.121	1/4	3/64	3/32	3/64	50	1/16
5/32	0.154 0.152	9/32	3/64	3/32	3/64	50	1/16
3/16	0.185 0.183	5/16	3/64	3/32	3/64	48	1/16
7/32	0.216 0.214	11/32	3/64	3/32	3/64	48	1/16
1/4	0.248 0.246	3/8	1/16	7/64	1/16	48	1/16
9/32	0.279 0.277	13/32	1/16	7/64	1/16	48	1/16
5/16	0.310 0.308	7/16	1/16	9/64	1/16	36	3/32
3/8	0.373 0.371	1/2	1/16	9/64	5/64	36	3/32
7/16	0.435 0.433	9/16	3/32	9/64	5/64	36	3/32
1/2	0.496 0.493	5/8	3/32	9/64	5/64	36	3/32

Dimensions in inches.

Clamps and Fittings for Rubber Hose

S. A. E. Recommended Aeronautic Practice

In order to comply with present practice and utilize existing hose connections, the list of sizes shown on S. A. E. data sheet 37, Vol. I, was recommended for aeronautic practice.

CASTLE HEXAGON NUTS

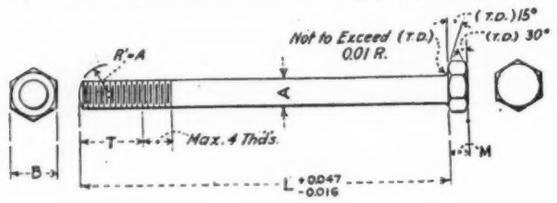
S. A. E. Recommended Aeronautic Practice

Size A and Threads per Inch	*B*	*N*	*S*	*O*	*M*	*L*	*R*
.164 (No. 8)—32	.375 (3/8)	.234 (15/64)	.078 (5/64)	.078 (5/64)	.156 (5/32)	.016 (1/64)	.094 (3/32)
.190 (No. 10)—32	.375 (3/8)	.250 (1/4)	.078 (5/64)	.078 (5/64)	.172 (11/64)	.031 (1/32)	.094 (3/32)
.216 (No. 12)—32	.438 (7/16)	.265 (17/64)	.078 (5/64)	.094 (3/32)	.172 (11/64)	.031 (1/32)	.094 (3/32)
.250 (1/4)—28	.438 (7/16)	.281 (9/32)	.078 (5/64)	.094 (3/32)	.188 (3/16)	.031 (1/32)	.094 (3/32)
.313 (5/16)—24	.500 (1/2)	.328 (21/64)	.078 (5/64)	.094 (3/32)	.234 (15/64)	.031 (1/32)	.094 (3/32)
.375 (3/8)—24	.563 (9/16)	.406 (13/32)	.125 (1/8)	.125 (1/8)	.281 (9/32)	.031 (1/32)	.094 (3/32)
.438 (7/16)—20	.688 (11/16)	.453 (29/64)	.125 (1/8)	.125 (1/8)	.328 (21/64)	.047 (3/64)	.125 (1/8)
.500 (1/2)—20	.750 (3/4)	.562 (9/16)	.125 (1/8)	.187 (3/16)	.375 (3/8)	.047 (3/64)	.125 (1/8)
.563 (9/16)—18	.875 (7/8)	.609 (39/64)	.156 (5/32)	.187 (3/16)	.422 (27/64)	.047 (3/64)	.156 (5/32)
.625 (5/8)—18	.938 (15/16)	.718 (23/32)	.156 (5/32)	.250 (1/4)	.469 (15/32)	.047 (3/64)	.156 (5/32)

A = Size of Bolt. B = Also Size of Hexagon. All Threads U. S. Form. T.D. = Tooling Dimensions. O = Also Depth of Slot. Dimensions in Inches.

Plain Hexagon-Head Bolts

S. A. E. Recommended Aeronautic Practice



$$M = \frac{A}{2} + \frac{1''}{32}$$

Bolts, Size A, Threads per Inch	*Limits A	B	M
.164 (No. 8)—32	0.164 0.160	.313 (5/16)	.125 (1/8)
.190 (No. 10)—32	0.190 0.186	.375 (3/8)	.125 (1/8)
.216 (No. 12)—32	0.216 0.212	.375 (3/8)	.125 (1/8)
.2500 (1/4")—28	0.250 0.246	.438 (7/16)	.156 (5/32)
.3125 (5/16")—24	0.313 0.309	.500 (1/2)	.188 (3/16)
.3750 (3/8")—24	0.375 0.371	.563 (9/16)	.219 (7/32)
.4375 (7/16")—20	0.438 0.434	.688 (11/16)	.250 (1/4)
.5000 (1/2")—20	0.500 0.496	.750 (3/4)	.281 (9/32)
.5625 (9/16")—18	0.563 0.558	.875 (7/8)	.313 (5/16)
.6250 (5/8")—18	0.625 0.620	.938 (15/16)	.344 (11/32)

When body length L =	1/2"	5/8"	3/4"	7/8"	1"	Over 1"
Length of thread T =	3/8"	7/16"	1/2"	1/2"	1/2"	3/4"

All threads U. S. Form. Dimensions in inches. T. D. = Tooling Dimensions
*Finished size, including plating or rust preventing treatment when used. Bureau of Standards recommend .001" as thickness of plating for rust prevention.

(10) Piston Pin Bearings, dia..... Length..... Matl.....
Location..... Method of fastening Pin in Rod or Piston..... Weight of Pin.....
(11) Connecting-rod Bearing, dia.... Length.... Matl....
Type..... Weight..... Method of Adjustment.....
Method of Holding Bearing in Rod.....
(12) Crankshaft, Type..... Weight.....
No. of Bearings... Dia. Main... Length of Front...
Length Intermediate..... Length Rear.....
Method of Adjusting Bearings.....
No. of Bolts each Bearing..... How held in Case.....
Dia. Hole in Main Bearings..... In Crank Pins.....
Dia. Hole in Crank Pins.... Dia. Hole Main Bearings...
Cheek Thickness next to Propeller End.....
Cheek Thickness of Balance of Crank.....
Dia. of Shaft through Radial Bearing.....
No. of Radial Bearings.... No. of Thrust Bearings....
Type of Thurst Bearing..... If Direct, what Type.....
Propeller Mounting.... Length of Taper.... Dia.....
Method of Holding Propeller Hub.....
No. of Hubs... If Geared, how is Gear held to Shaft...
If Taper, give Length..... Dia.....
Is Radial used in addition to Plain Bearing.....
(13) Camshaft Bearings, No..... Dias.....
Material..... Lengths.....
(14) Type of Cams..... Type of Valve-Lifters.....
(15) Inlet Valves, No. per Cyl.....o.d..... Port Dia.....
Lift..... Seat Angle.....deg.
(16) Exhaust Valves, No. per Cyl....o.d..... Port Dia.....
Lift..... Seat Angle.....deg.
(17) Weight of Valve Reciprocating Parts, Inlet.....lb.
Exhaust.....lb.
(18) Valve-Spring Tension, Inlet open.....lb. Closed.....lb.
Exhaust open.....lb. Closed.....lb.
(19) Valve-Timing, Inlet opens.....deg. Top Center
Closes.....deg. after Lower Center
Exhaust opens.....deg. before Lower Center
Closes.....deg. Top Center
(20) Geared Drive, Pitch.... No. Teeth Crankshaft Gear....
No. Teeth Propeller Gear..... Width of Face.....
Type Gear..... Matl.....
(21) Propeller Shaft, Type Thrust Bearing.....
No..... Radial Bearing, Front..... Rear.....
Type of Propeller Hub Mounting..... No. of Hub.....

Carburetion

(22) Carbureter, Name and Model.....
(23) Specification (size of Nozzles, etc.).....
(24) How Heated .....
(25) General Principles of Operation.....
(26) Description of Intake Pipe.....

Ignition

(27) Name and Type of System.....
(28) Type of Distributor..... Firing Order.....
(29) Type of Breaker.....
Maximum Spark Advance.....deg. Retard.....deg.
(30) Spark Plugs, Name and Type... How many... Size...

Lubrication

(32) Type and Description.....
Pressure used .....
(33) Main Bearing Hub.....
(34) Crank Pin .....
(35) Cylinder .....
(36) How is Oil Cooled.....
(37) Capacity of Oil Container.....
(38) What Type Pump.....
(39) Oil used .....

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Rimco Rubber Insulated Pliers

ELECTRICIANS working on high tension distributing circuits always make use of pliers with insulated handles. This same tool is also useful in ignition work. The Rubber Insulated Metals Corp. of Plainfield, N. J., has developed a

Pliers with rubber-covered handles

new type of insulated handle plier in which the rubber covering, instead of being hard, is semi-soft. The result is that the insulation will not crack or break when the tool is dropped on a hard surface. In order to obviate breakage of the rubber covering, in some instances rubber tubes have been slipped over metal handles, but in the tool here illustrated the rubber compound is united to the metal by what is known as the Elchemco process, which is said to effect a permanent bond. These pliers, before being shipped, are subjected to a test under 10,000-volt electrical pressure.

Owing to the rubber covering of the handles the pliers are more pleasant to work with in cold weather than pliers with bare metal handles.

Automobile Conditions in South Africa

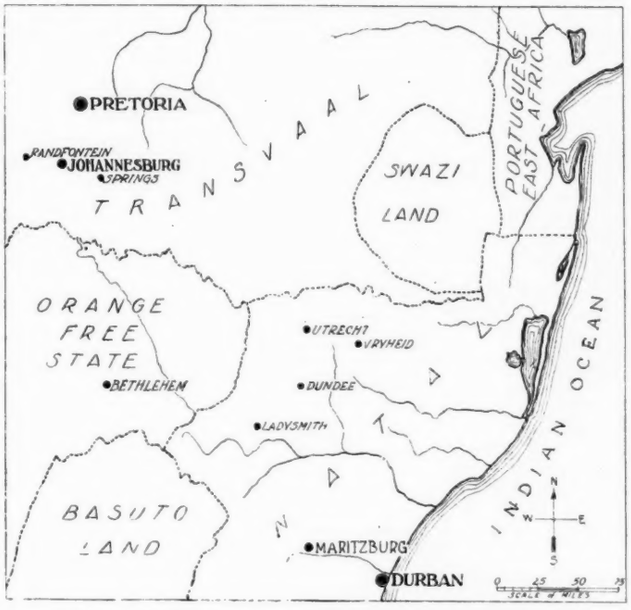
Transvaal's Mining Industry Furnishes the Chief Market in That Province—High Cost of Fuel a Hindrance to Sales — Natal a Prosperous Agricultural Country and Farmers Buying Cars

JOHANNESBURG, SOUTH AFRICA, Nov. 7.—The sale of automobiles in Johannesburg and this district is almost entirely dependent on the mining industry. The principal classes of buyers are business and professional men. This is largely due to there being little manufacturing of any description carried on in the Transvaal, which in turn is due to the absence of any source of production of raw material and also to the high cost of labor.

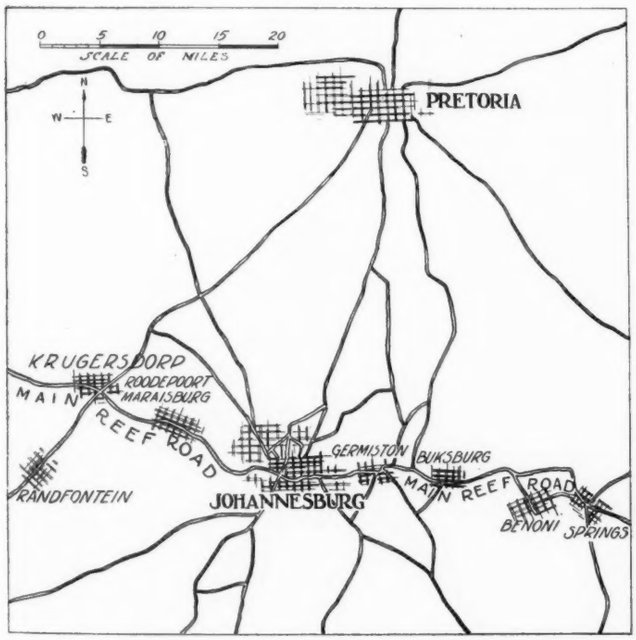
Conditions here are about as they have been under war conditions, excepting that during the past few months there has been an acute shortage of gasoline, and the price to-day is $4.08 per Imperial gallon. It is hoped that these conditions will soon improve, as there are several large consignments of gasoline due here. There are three suppliers of gasoline for this territory, namely, the Vacuum Oil Co. of South Africa, which is an offshoot of the Standard Oil Co.; the Texas Oil Co., and the British-American Oil Co.

Johannesburg has no definite selling season for automobiles, the sales being generally distributed more or less freely the year round, and while the sale of cars is to business and professional men, these are so largely dependent on the mining industry that sales generally respond to mining conditions.

The farming community purchases generally from August to December, this being the time they are paid for their crops, and it is during these months that the dealers endeavor to stimulate sales and introduce new models. C. Whitehead, general manager of the Johannesburg Motor Mart, reports that the used-car problem is one of the greatest troubles in that section, and that



Map of Natal and parts of adjoining provinces



Main road system of the Transvaal

one of the principal difficulties in connection with it is the ridiculous values given by dealers handling comparatively unknown makes of cars in order to introduce them. In the original sales of these cars the dealers will give any discount asked for.

The sale of automobiles in the Transvaal and in the vicinity of Johannesburg is not stimulated by good roads and touring through the country for pleasure as known in America and Europe scarcely exists. The road mostly used around Johannesburg is known as the Main Reef Road, which couples up the principal mines of Witwatersrand and is 60 miles in length. It extends as far as Springs to the east and Randfontein on the west. The surface is good and is generally well maintained. The gradients are not exceptionally heavy, so that an average four-cylinder American car, such as Studebaker or Buick, is able to make the round trip on high gear. Officials of the mining companies and merchants transacting business with the various mines are great users of this road. Perhaps the greatest inconvenience in motoring in the mining district is the high winds which prevail here, and which carry the dust from the mine sand dumps so that the road is frequently bathed in this dust.

The most popular road for motorists is that between

A view in West Street, Durban

Attractive scenery along the Umkomaas River, Natal

Johannesburg and Pretoria, 37 miles. This road is well maintained and has no heavy grades.

The longest touring trip that can be considered a popular one is from Johannesburg to Durban, which is the popular health resort for Johannesburg people. It is a 400-mile trip, and the road is good as country roads in the Transvaal go, but recently it has been badly washed away by the heavy rains. The worst feature of the road is the number of gates dividing off the various farms. There are sixty of these in the first hundred miles out of Johannesburg, and opening and closing these cut down the pleasure of the trip.

There are any number of other roads radiating from Johannesburg to outlying towns, but these do not compare with those mentioned so far as popularity is concerned. In the outside districts of the Transvaal the success or failure of crops affects the sale of automobiles very materially. Fruit farming is a small industry, but during the past few years rapid strides have been made in the growing of citrus fruits which will eventually be reflected in the increased purchasing power of the Transvaal.

DURBAN, NATAL, SOUTH AFRICA, Nov. 8—Durban is the summer resort for all citizens in Johannesburg and many other parts of the Transvaal. Durban is 400 miles by automobile from Johannesburg. It is the business center of the Province of Natal. Before the coming together of the several South African provinces into the Union of South Africa, Maritzburg was the capital of Natal, but Durban now holds the business center. Durban is one of South Africa's principal ports for the export of wool and corn, and a big bid has been made for these industries opening up in British South Africa. The value of Durban as an automobile center has increased. Ten years ago Durban was the chief port for Natal shipping, but little else. At that time it started developing and has continued to gain so that now it is counted as one of the five or six real business centers of South Africa.

Town gardens, Durban

The Durban of to-day differs from the Durban of 10 years ago about the same as the 1918 automobile model differs from the 1908 model. The city is really one of mushroom growth, and is no longer merely a calling place for vessels but the most popular summer resort in South Africa. The city is exceptionally well laid out, is particularly clean at all times, and merits the name of Dainty Durban, which has been generally bestowed upon it.

As a resort city it is one of the most attractive centers for the motorist, and to-day there are between 5000 and 6000 automobiles in the city. There are but few cars in the district adjoining Durban.

The Province of Natal differs very considerably from other provinces in the Union inasmuch as one finds that a comparatively small area such as is not or cannot be turned to good account in agriculture. Most of the sugar plantations are in Natal, and this province, generally spoken of as the Garden of South Africa, is the most thickly populated province. In Natal one meets the British farmer more often than in any other province of South Africa. Already the farmer is a good buyer of motor cars. The car best suited for these farmers is one reasonably light, must have a good clearance, must be substantially built, and should sell at a reasonable price.

The conditions at Maritzburg are almost diametrically opposite to those of Durban. You find very few cars in Maritzburg, but a great many in the district adjoining it.

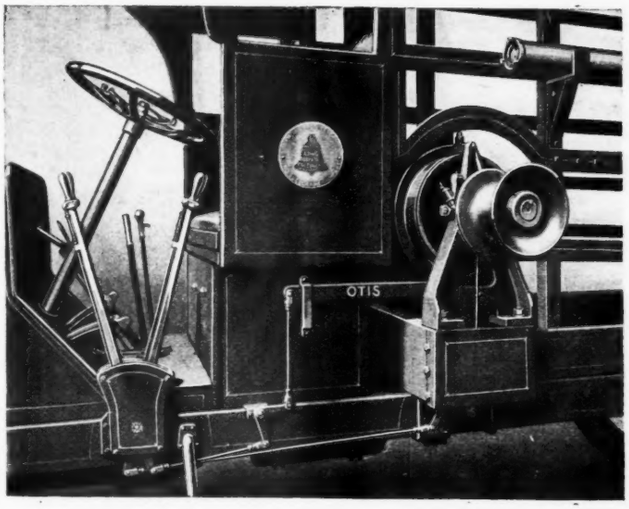
Impurities in Malleable Castings

FROM the point of view of analyses, malleable castings contain more silicon and sulphur but less manganese than steel, and while in steel it is considered advisable to keep the phosphorus under 0.06 per cent, the phosphorus of malleable castings can safely be a maximum of 0.25 per cent. In malleable castings the carbon can be considerably reduced by annealing, but the silicon, sulphur, phosphorus and manganese remain practically constant. Under these conditions, says E. Adamson, in a paper read before the Staffordshire Iron and Steel Institute, only certain particular classes of pig iron are suitable for malleable castings, while for steel—broadly speaking—any pig iron can be used, according to process.

Otis Power Winch for Motor Trucks

Serviceable for Hoisting Loads, Erecting Poles, Drawing Cable Through Conduits and for Various Other Uses

FOR use in handling the loads of heavy trucks the Otis Elevator Co., New York, has developed a power winch which can be fitted to the truck. It consists of a winding drum which rotates freely on a drum shaft, a worm and gear reduction inclosed in a cast-iron gear case, a clutch-operating device and a brake. This power winch has proven of particular service to electric light and power companies



Otis winch on truck, showing the operating levers

for hauling reels, pulling electric light wire through conduits, etc. Telephone companies use the winch for raising poles, and moving concerns use it for hoisting pianos and other heavy articles. The winch is also a very handy piece of apparatus on the trucks of contractors.

The worm gear is made of bronze and the worm is cut from a solid forging. To the outer end of the worm shaft is fitted a ball thrust bearing, designed to take up the end thrust in both directions. Worm and gear are inclosed in a cast-iron case which is provided with hand holes, sight holes and clean-out pockets, so that the worm and gear surfaces may be readily inspected without removing the entire upper case. The outer drum shaft bearing of the gear case is equipped with marine thrust grooves, which are utilized to keep the worm gear and worm in proper alignment.

The winding drum, which is 8 in. in diameter, has a face of 12 in. and flanges 18 in. in diameter, is capable of carrying about 650 ft. of ½-in. steel rope. The drum is fitted with brass bushings and rotates freely on the drum shaft in either direction. For lubrication the oil chamber in the drum is occasionally filled with heavy machine oil.

Secured to the outer ends of the drum is the brake wheel and flange of electric steel. The brake is of the double-acting external type and is lined with multibestos. It is of sufficient power to safely hold the greatest load that can be handled by the winch. The clutch mechanism consists of a semi-steel three-point jaw clutch which is drawn into engagement with corresponding jaws integral with the drum by means of a conveniently located lever.

Nigger Head for Hoisting or Hauling

In addition to the winding drum, a nigger head is furnished as standard equipment on either end of the drum shaft. If desired, the company furnishes nigger heads on both ends of the drum shaft at a slight additional cost. The nigger heads provide a convenient means of hoisting or hauling with manila ropes when it is not desired to use the drum with steel ropes.

For operating the Otis winch, power from the truck engine is used, which is transmitted to the winch by means of a sprocket and chain or by a universal joint connection between the worm shaft of the winch and the power take-off shaft of the transmission or main drive shaft. The winch is designed to be mounted directly behind the driver's seat and is so arranged that connections can readily be made from the clutch operating device and brake lever to the hand levers located convenient to the driver's seat. Thus the truck operator has direct control over the operation of the winch without leaving his seat.

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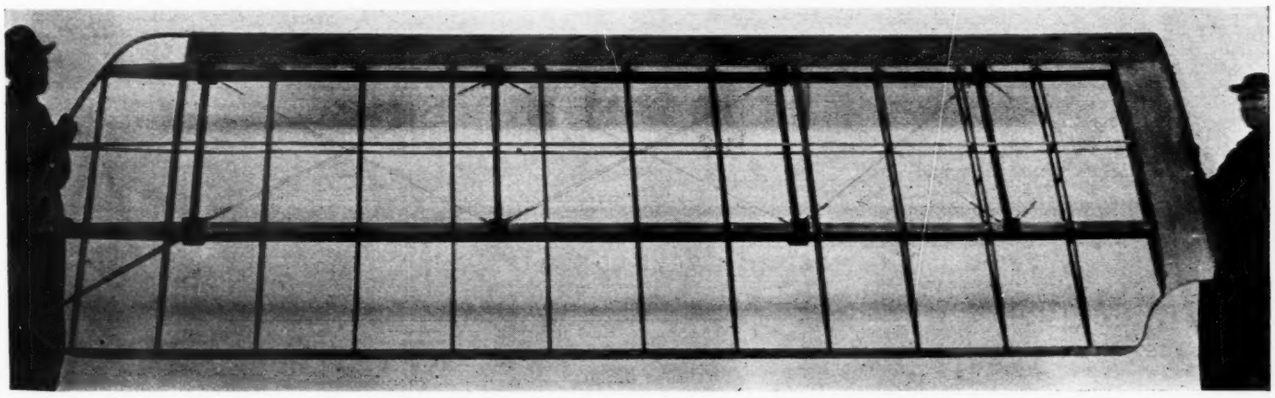
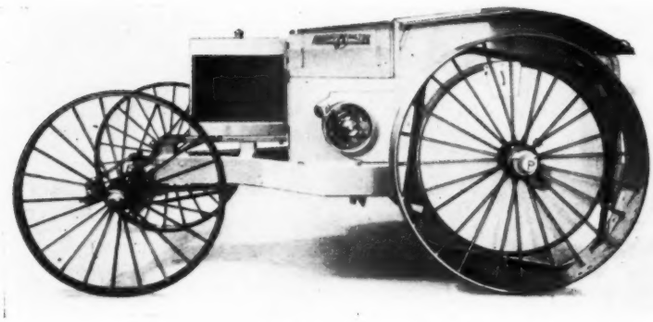
Airplane Wing Construction

THE accompanying photograph shows a wing designed by the engineering force of the Lawson Aircraft Corp., Green Bay, Wis., for the new MT-2 Lawson machine, which is to be used for advanced training and reconnaissance work over the trenches. It is constructed entirely of wood, except for the metal fittings which connect the internal compression struts to the spars. The wing tip is bent from one piece of second growth white ash, and the internal wing fittings are pressed from one piece of steel, with projecting prongs to take the cross struts, thus making these members into sockets.

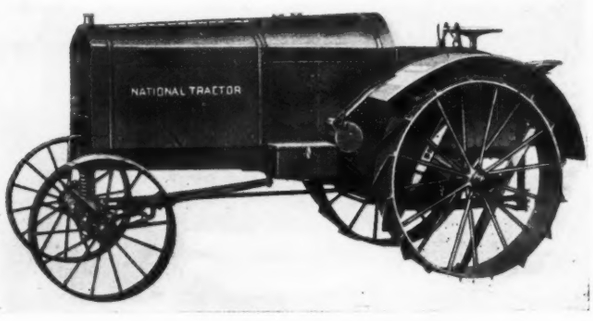


Skeleton of Lawson airplane wing

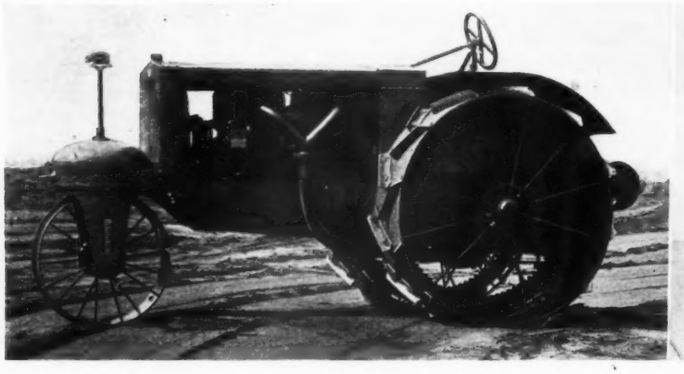
Some Modern Tractor Types



The new Parrett



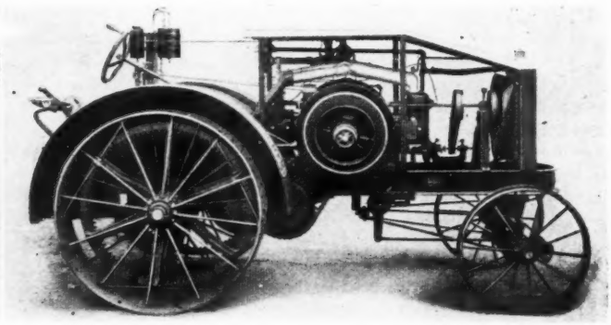
The National



The Wallis

The R. & P. with T. & P. wheels

The Sexton



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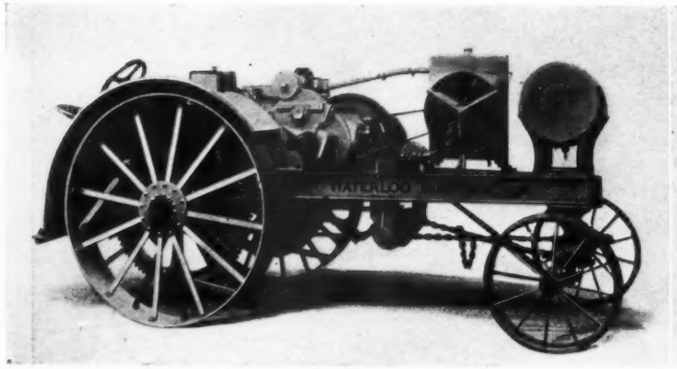

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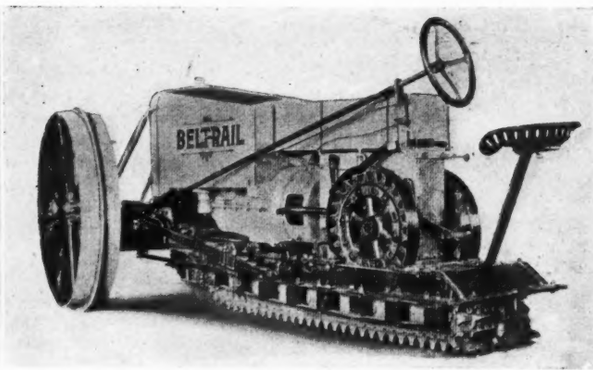

The Belt-Rail

Dope Poisoning

(*Continued from page* 495)

worked in a narrow aisle with wings stacked close on either side, drying or in course of doping, and the sun beat on the glass roof and walls.

The nervous symptoms were sometimes fairly severe, resulting in loss of consciousness, with temporary respiratory failure. Two men were doping wings in a room that had no artificial ventilation, and one of them was taken with dizziness and faintness and fell to the floor. The other, stooping to help him, upset the pail of dope, spilling some of it on the clothes of the prostrate man. Both had to be carried out into the open air, but the second man revived fairly quickly; the first was unconscious for a short time and had an alarming respiratory failure, so that artificial respiration had to be resorted to and his dope-soaked clothing removed before he revived. However, by the time the doctor arrived he was breathing again, and neither man experienced any lasting result, though both felt weak for several days.

Nausea and headache are likely to follow one of these attacks of dizziness and faintness, but symptoms of abdominal disturbance of any seriousness were apparently not present.

Constipation was complained of only occasionally. Two men spoke of an increased craving for food at the same time that they were losing weight. Men who use tetrachlorethane dope for many weeks or months are said by fellow workmen to have a dull, dopey look in the eyes.

The men using acetone-amyl acetate-benzol-methylalcohol dopes did not complain nearly so often of dizziness, drowsiness, or attacks of faintness as did the tetrachlorethane men.

Some of the men using amyl-acetate dopes complained of headache during the first hours of work, of cold hands and feet, of itching eyelids, watery eyes, feeling of dryness in the throat, and that vague sensation of drowsiness, slight nausea, and weariness, which they describe under the term dopey.

There seems to be a general impression among the men who use tetrachlorethane dopes that they are less harmful than the dopes containing amyl acetate. The disagreeable odor of the latter and its irritating effect on the eyelids and on the throat are experienced at once, while tetrachlorethane, with its less overpowering odor, has no immediate effect, and seems to the workmen comparatively harmless. This opinion is shared by some physicians also, but it is quite wrong. Amyl acetate, though disagreeable, is not at all a dangerous poison, while tetrachlorethane is a slow, insidious poison to the cells of the liver and kidneys. Nevertheless, it is not at all unusual to hear a foreman say that he tried at first to use an amyl acetate dope, but had to give it up and take one with tetrachlorethane as a solvent, because his men could not stand the banana oil.

It must be remembered that the effect of these volatile solvents on workers in American airplane factories has not really been tried out. They have been exposed to fumes only at intervals and for short periods. Fifty-three dopers were asked as to the number of weeks or months they had been employed and all but five had worked less than a year. Seventeen had been doping for less than one month, 12 from one to three months, and 11 from three to six months, leaving only 13 who had worked over six months.

This is one reason why there has been no serious poisoning from volatile dope solvents in this country up to the present time. Another reason is found in the fact that much of the doping has been done in the open air, or under a shed with open sides, and so the fumes from the solvents were rarely heavy. Naturally since our entrance into the war these conditions have changed, and we have no reason to think that we shall escape the experience of the British and Germans with toxic jaundice if we continue to use tetrachlorethane dopes and do not adopt vigorous methods for the protection of dopers from fumes, for from now on there will be many men at work doping throughout their full shift, and they will be in rooms filled with dope-covered fabric, nor are the other solvents free from dangers. Indeed their poisons may prove to be greater than we now think.

British Instruction to Avoid Dope Poisoning

(*Continued from page* 495)

out, improvement in health has resulted. And when such an arrangement is adopted occasional necessary overtime might, it is suggested, be undertaken by those on the out turn rather than by those who have already worked a full day in doping.

In addition to the alternation referred to, in one factory the women engaged in doping are made to spend half an hour morning and afternoon in the open air, so that no spell of work in contact with the fumes lasts longer than two hours.

(c)—*Periodic medical examination.*—A fortnightly medical examination has served a useful purpose, both in reassuring the workers and also in enabling those showing premonitory symptoms to be suspended or transferred to other work. The objective signs, however, which the surgeon has to guide him are few, and he can be materially assisted by information from the foreman or matron as to the state of health of the workers in the intervals between his examinations. After each visit the surgeon should state in writing the names of those (if any) whom he considers should be—

(a)—Suspended as definitely suffering from dope poisoning necessitating absence from work until they are quite well, or

(b)—Transferred temporarily to other work as a precautionary measure on account of equivocal signs.

8—Medical supervision on these lines has been adopted on their own initiative or on suggestion from the factory department in several aeroplane works, and the same course should be pursued in all where doping is continuous. It is important that it should be carried out by a medical practitioner who is familiar with the nature of the work and the symptoms to which it may give rise, preferably by the certifying surgeon, as he is in touch with the department and is thus kept informed of the latest observations on the subject. A health register and instructions as to the conduct of the examination will be sent by the medical inspector to the medical man whom you appoint for the purpose as soon as notice of his name is received here.

9—A worker suffering from effects of dope should be excluded from all contact with it until he is quite well, a medical certificate to that effect being obtained. Instances are known in which premature resumption led to recurrence of symptoms in an aggravated form.

10—*Instruction to workers.*—Certain apparently small points have been noticed which have a bearing on liability to attack. Some instruction to new workers as to how they can best avoid inhalation of fumes without interfering with work is called for, especially bearing in mind the youthfulness of some of them.

(a)—Doping should be commenced at the end of the wing nearest to the exhaust fans and should proceed backward from that point.

(b)—In some factories the wings, as soon as the doped surface is "tacky," are carried to a drying room or closed chamber (separately ventilated), thus diminishing largely risk from inhalation of fumes. Where no such arrangement exists, the wings should be placed to dry in a position between the workers and the exhaust draft, but not so as to obstruct the fans.

(c)—After doping, the safest position for the worker is that nearest to the fresh air inlets, but frequently men and women are seen standing close to the exhaust, and therefore breathing the air which is most highly charged with the noxious vapor; the reason being that either the flat top of the outlet duct has been found a convenient place to keep dope pots, brushes, etc., or the light is better there than at the far side. Short-sightedness, unless corrected by glasses, should debar from taping if not from doping.

(d)—Work should not be commenced on an empty stomach, and where tetrachlorethane is an ingredient of the dope a worker "must not be allowed to take a meal or to remain during the times allowed to him for meals in any room in which such substance is used." (Factory Act, 1901, S. 75.)

Hence the need for provision of a properly equipped meal room on lines suggested by the health of munition workers' committee is self-evident.

11—Even if, as is hoped, discovery of an efficient substitute enables use of tetrachlorethane to be eliminated from the dope, exhaust ventilation will still be necessary to prevent the effects (fortunately much less noxious) from such solvents and diluents as benzene, acetone, and methylated spirit, which must necessarily continue to be used.

AUTOMOTIVE INDUSTRIES
The Automobile

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Cars at a Premium

TRANSPORTATION difficulties and the utilization of plant space for war work have resulted in the reduced automobile production which was predicted some time ago. The pendulum has now swung so far over to the other side that it is a matter for careful consideration whether or not the output of the factories this year is going to meet the demand of the country.

When the Ford Motor Co., for instance, curtails its output by 50 per cent it means that 1500 low-priced cars less are turned out every day. This leaves a demand which must be met by other concerns, and even if only two-thirds of this business were to be distributed among other manufacturers it would mean 1000 possible sales of low-priced cars per day. However, with production reduced all over the country from 30 to 40 per cent below what it normally would have been, it is difficult to see how the demand is going to be met.

Present indications are that automobiles are going to be at a premium by July 1. This is true not only of new cars but of used cars as well. Shipments to eastern points have been discontinued by several of the largest producing concerns simply because of freight embargoes. The result of this is that New York dealers are paying express rates for quick deliveries. It is even impossible to secure express equipment as promptly as desired, with the result that, unless cars are driven from the manufacturing points to the eastern market, they cannot be delivered.

The next two months are the most difficult period of the year for drive-aways in the Middle West, where the roads are of the so-called gravel construction. These roads become so soft in the early spring that they are impassable, and manufacturing districts are practically isolated in some instances as far as road traffic is concerned.

With this situation in mind, manufacturers in a position to produce cars at the present time should by all means turn out the maximum possible number to take advantage of the coming market. The material situation is no longer a hindrance to any serious extent, and with the roads cleared for drive-aways there is no doubt that those who are prepared will reap a reward for their foresight in the months of May, June, July and August, as well as during the fall season.

Volumetric Efficiency

WHILE the term volumetric efficiency—which has come to be very much used in internal combustion engine literature, especially since kerosene and distillate have been widely adopted as fuel and preheating of the mixture has become necessary—has a fairly definite meaning, we do not remember ever having seen an exact definition. Efficiency in engineering terminology is generally defined as the proportion or the percentage of results actually obtained to the best results obtainable under ideal conditions.

Now, the most air that can be drawn into a cylinder by the method usually employed is that corresponding to the piston displacement volume at atmospheric pressure and temperature, and it would seem at first sight that this would be the logical basis for determining the volumetric efficiency. However, as the air is drawn into the cylinder, gasoline is mixed with it and vaporized, and this gasoline vapor necessarily occupies some space, so in actual operation it is quite impossible to draw in an amount of air equal to the piston displacement volume at atmospheric pressure and temperature. True, the relative volume of the fuel vapor is very small. With a weight ratio of 16 to 1 between the air and the fuel and a vapor density of the fuel of a little over 3, the volume occupied by the fuel in the gaseous state is only about 2 per cent of the total. Nevertheless, it is desirable that volumetric efficiency should have an absolutely definite meaning and it might be well for the Research Division of the S. A. E. Standards Committee to say whether it should be based on a piston displacement volume of air at atmospheric pressure and temperature or on an amount of air smaller than this to make allowance for the fuel vapor in the air.

The Liberty Engine

NOW that it has been conclusively demonstrated, and we hope to the satisfaction of all those who opposed the standardization work in this engine, that the Liberty aviation engine is a success far beyond the expectations of the most sanguine, that the War Department and the Aircraft Production Board will not fail to impress the country through a good publicity campaign of what has really been accomplished.

The development of the Liberty engine stands as one of the greatest victories of the war and as one of the great if not the greatest contribution America has made. Ten times more has been accomplished with this engine than is generally known throughout the country, due to the desire to keep the information from those who might misuse it. It would be better to get much of this information to those in our own land who do not know it and would be better war workers if they did, than to work so hard to keep in the dark what has unquestionably been known in Germany for months.

A great good can be accomplished at home by a fuller knowledge of the performance of this engine. As yet not a few of the baseless rumors of troubles with the engine have not been sufficiently stamped out. The enemy within our ranks has been very active and has been too quick to turn a situation into a veritable criticism or knock.

A recent example was that of a news item mentioning that the first Liberty engine had been shipped to a certain aviation field with instructions not to use it for flying but for instruction only, the kickback being the inference that it was not reliable enough for flying.

This was not the case, the aviation field in question asking for one for instruction purposes only. The engine shipped was one of the earliest models and which did not incorporate all of the refinements of the jobs that are now going through production and are being shipped to France and being flown so generally in this country.

Some remarkable cross-country flights have been made and the nation should get this convincing evidence of the prowess of the engine and the plane.

The Kerosene Knock

THE exact reason for the kerosene knock, which has been such a problem to overcome in the burning of kerosene in tractor engines, remains a much mooted question among many tractor engineers. Reducing the compression, adding a percentage of water to the explosive mixture, improved water-jacketing of the cylinder heads and cylinder walls, the valve seats and the spark plugs, have all been tried, and while they bring results they do not strike at the fundamental solution of the problem.

Various explanations of the knock have been made but not sufficient research work has been done in different laboratories to give as complete an analysis of the subject as it warrants. The person furnishing a correct and comprehensive solution of the mystery will perform a peculiarly valuable service that should reduce the too general abuse of kerosene in that it is not being efficiently burned to-day as is gasoline. It is relatively easy to operate a vehicle on kerosene if no regard is given to the consumption per horsepower hour and flexibility, but where economy and flexibility are taken into consideration the problem becomes very much greater.

One research engineer, who has been working actively on this task for several years and who is yet far from the end of his labors, ascribed the kerosene knock to secondary explosions or detonations, some of which take place quite some time after the original explosion and often after the piston is well past the top center. Some of these secondary explosions are very violent, producing high pressures for very short periods. Numerous experiments seem to establish a marked similarity of such explosions with different grades of kerosene, whereas in other fuels such detonations are entirely lacking. These explosions and the resulting knock seem the best evidence that kerosene is not being efficiently handled. The very nature of kerosene makes the problem much more difficult than with other fuels which are more uniform in their constituency.

Tractor Ratings

ONE benefit to be gained from industries getting together and co-operating as compared with keeping apart and needlessly competing is that one may profit by the merits as well as the faults of the other. In this respect there is opportunity for more good coming to each industry by the automobile and the truck and the tractor getting into closer contact. Each has suffered or is suffering from similar abuses.

First the automobile was overrated in horsepower and speed and damage was done. Some firms seriously injured themselves by such tactics. Then came the motor truck and the merchandising talent ran rampant in claiming 100 per cent overload, high speeds and lack of attention. Many a good truck prospect was killed by the extravagant claims of the merchandiser. Lastly, we have the farm tractor being overrated by not a few concerns, only to find the maker reaping his own wild oats by the antagonism bred within the farmer and also the doubt that arises in the farmer's mind. Already tractor overrating is exhibiting a boomerang influence and much greater effect will follow if the pernicious policy is continued.

It is unfortunate that some tractor makers practically refuse to co-operate on some standard method of rating. Each firm thus refusing is only fogging the issue with the farmer, and while such makers may picture some individual advantage it has happened in the past that those gross offenders have always had to bear their proportion of the punishment.

It will prove a great advantage to the entire tractor industry not to befog the issue but to get together and make tractor sales easier for all. Co-operation will accomplish much more than misleading competition.

□ Latest News of the

Agreement With War Industries Board

Favorable Arrangements for 1918 Production—Suitable Coal Agreement

NEW YORK CITY, March 7—An agreement has been reached between the National Automobile Chamber of Commerce, through its Fuel Committee and the War Industries Board, with regard to passenger car production, which is a very favorable one as relating to the automobile industry, and has every indication that the War Industries Board is giving the most careful consideration to all industries.

The agreement is good evidence of the fact that official Washington recognizes how essential it is to maintain all industries whether so-called direct war industries, that is, those manufacturing guns, shells, clothing and everything needed in the war zone, and also what has been designated as non-war industries, namely, those in which the products are not so entirely utilized in the war zone.

According to the agreement the automobile manufacturers are asked to reduce their 1918 output approximately 30 per cent as compared with what their plans for 1918 production were on July 1, 1917. Supposing at that time a firm committed itself to parts and materials for 100,000 automobiles, such a firm, under the new agreement, would produce 70,000 machines by July 31, 1918.

Such an agreement is very favorable to the automobile industry in that the majority of cases it will not mean any different program of production than what the different factories have been pursuing for many months. In other words, the majority of factories have been manufacturing at a lower pace than 70 per cent of their commitments for last July, and as such the present agreement does not have any effect. There are other companies which may have been manufacturing but 50 per cent of their commitments, and such will, under the agreement, be permitted to increase from now until next July in proportion as they have dropped behind the 70 per cent mark from last July up to the present time.

The agreement should have a very stabilizing effect on the industry in that there is now a definite understanding with the government, and such agreement means a recognition on the part of the government of the essential work of the automobile industry in war times. It was very questionable if such a favorable agreement could have been accomplished last November when the chrome steel crisis arose, and it is very questionable if anything so favorable could have been arrived at in January when the coal crisis was on. The industry certainly can congratulate the War Industries Board on the broad view it takes of industry in general and the necessity of properly looking into the national functions of an industry, such as the automobile industry, before determining upon any policy of curtailment with regard to it. It is almost a certainty that if a curtailment had been arrived at in November or January, it would have been much more severe than the present one.

The present curtailment can scarcely be looked upon in the sense of the word, as there will only be two or three firms at the outside that may have to reduce present production.

Undoubtedly the right of appeal by any manufacturer to the War Industries Board is covered in the agreement, as there is nothing to indicate that the War Industries Board has not the fullest appreciation of the national and world necessity of the automobile as a conserver of man power in these war days.

The present agreement, besides being with the War Industries Board, which covers the question of materials for automobiles, and also takes consideration of transportation, etc., further is an agreement with the Fuel Administration and insures the manufacturer coal. This is a very considerable factor in the case.

—

Liberty Engine Production

WASHINGTON, March 5—The Liberty airplane motors will soon be turned out at the rate of 300 per day from 5 specially designated automobile and airplane factories. The Ford Motor Co. will produce 100 a day, Packard Motor Co., Marmon Co., Lincoln Motors Co. and the General Motors Corp. 50 a day. The present program calls for 22,000 planes to cost about $2,0000,000,000. The greatest production is expected to be attained early this summer. At this time manufacturing energies are concentrated to the high power battle planes of the 12-cylinder type, which are developing 1 hp. to every 2 lbs. weight, 450 hp. to approximately 900 lbs. weight.

—

$450,000,000 More for Aircraft

WASHINGTON, March 6—The War Department yesterday asked Congress for an additional appropriation of $450,000,000 for aircraft. Of this amount, $200,000,000 is needed to make up a deficiency in the $640,000,000 aviation fund provided last year, and the remainder will be used for new aircraft supplies and equipment.

N.A.C.C. Withdraws from Automobile Committee

Hugh Chalmers, Its Representative, Resigns—Lee Also Has Withdrawn

NEW YORK CITY, March 6—The Automobile Industries Committee, so far as the National Automobile Chamber of Commerce, Inc., is concerned, has ceased to be a representative of the chamber, and Hugh Chalmers, the N. A. C. C. representative on the committee, has resigned. For some months Mr. Chalmers is going to give his services to the N. A. C. C. in connection with the Washington work, as he is very familiar with Government matters, due to his poisition on the Automobile Industries Committee since its inception last November.

The N. A. C. C. for several months has been maintaining its own Washington office under the direct management of Alfred Reeves, its general manager, and this office will, it is understood, continue to be the point of contact between the Chamber and the Government departments.

The Automobile Industries Committee formed last November consisted of A. W. Copland, representing the Motor & Accessory Manufacturers, Inc.; Hugh Chalmers, representing the N. A. C. C., and J. R. Lee, representing the Ford company. Mr. Lee has withdrawn from the committee, so that there remains but Chairman Copland representing the accessory industry. It is understood that a meeting of the Motor & Accessory Manufacturers will be held soon at which its attitude with regard to the committee will be taken up.

Since its inception the Automobile Industries Committee has accomplished much good. It was appointed at the time of the chrome nickel crisis when shipments of this metal to the automobile industry were being stopped. At that time the Government's attitude towards the industry was that of a non-essential. The committee served as an excellent point of contact not only between the Council of National Defense, but also between Government departments. The attitude of the Government towards the industry has changed from that of considering it a non-essential up to that of considering the passenger car a public utility as it was considered during the coalless days in January. The committee threw itself into the breach at the critical period in November and warded off any precipitate

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Automotive Industries

Plan Strict Policy for Industry

Some Curtailment of Non-War Manufactures — Coal Production Hampered by Transportation

WASHINGTON, March 6—The attitude of the Government toward industry during this year is awaited with interest by all manufacturers. Up to this time we have had many conflicting opinions and conflicting decisions.

Starting the war with hazy ideas for completely abolishing some so-called non-essential industries and seriously curtailing others, most of the officials here have now revised their opinions to a more logical basis.

We can gather some idea of the attitude of the Government toward industry by the President's outline of the increased functions of the War Industries Board and conveyed by him to Bernard M. Baruch this week in a letter requesting Mr. Baruch to accept the chairmanship of the War Industries Board. In addition, in an unofficial letter to Waddill Catchings of the United States Chamber of Commerce, George N. Peek, Industrial Representative of the War Industries Board, has made clear his personal views and those of some of his associates in the Council of National Defense. These are not strictly official views, but might be regarded as quasi-official.

The views of Mr. Peek and President Wilson are particularly important, because Mr. Peek represents the Government in its dealings with the automotive industries. Having just concluded a series of conferences with the fuel committee the President's views show the attitude we may expect from the War Industries Board, Fuel Administration and other Government agencies toward the automotive industries as regards allowances of fuel, steel labor and so forth, for we may be assured that all Government departments will reflect the presidential viewpoint.

"The first consideration of the nation and of all its industries," stated Mr. Peek, "must be to contribute the utmost toward winning the war, and to that end business must when necessary be diverted from its established channels into new channels. Or if absolutely necessary, the flow must, during the war, be entirely stopped in order to provide adequate labor and materials for war needs.

"It does not, however, follow that there will be less business than usual, but rather more unusual business."

With regard to non-essentials, Mr. Peek said that "if the so-called non-essential industries are cut off many of them would be ruined and others permanently crippled.

"War industries and railroads must have at least 100,000 tons more coal per day than they had in 1917 or the flow of war necessities will be dangerously interrupted. This increase must be met by curtailment of the so-called non-essential production and by economy at every furnace door, both household and industrial.

"The demands for 1918 to carry out the program for production of necessities for the war, in addition to the normal business, would greatly exceed any possible production and distribution of fuel, so there is but one remedy which is to limit the production of non-war industries sufficiently to provide for:

"(1) War needs direct and indirect.

"(2) Necessities for public welfare and domestic consumption.

"In accomplishing the desired end it should be our effort to divert the energies of non-war industries as far as possible to the production of essentials for war so that each industrial center may use existing facilities with its labor living at home, happy and contented.

"In the re-adjustment process it is inevitable that the normal business of some industries must be interfered with in order that production of war and public necessities be kept at the maximum. It may be that some plants because of lack of power, shortage of labor, raw materials or transportation may have to suspend entirely. These sacrifices must be endured in the interest of our first object, which is to win the war."

The statement also points out that on account of transportation conditions the United States probably will mine little if any more coal in 1918 than in 1917.

In his letter to Mr. Baruch, President Wilson outlines the vastly increased powers of the War Industries Board as follows:

(1) The creation of new facilities and disclosing, if necesssary, the opening up of new or additional sources of supply.

(2) The conversion of existing facilities, where necessary, to new uses.

(3) The studious conservation of resources and facilities by scientific, commercial and industrial economics.

(4) Advice to the several purchasing agencies of the government with regard to the prices to be paid.

(5) The determination, wherever necessary, of priorities of production and of delivery and of the proportions of any given article to be made immediately accessible to the several purchasing agencies when the

(*Continued on page* 519)

W.T.B. May Change Export Plans

Regulations Between Maker and Distributor on War Tax Will Probably Be Altered

WASHINGTON, D. C., March 5.—The War Trade Board has been asked to modify its present plan of export regarding automobile parts. Under the existing scheme separate blanks must be used for every different kind of metal exported. This naturally would necessitate unreasonable labor for parts exporters. It is expected the War Trade Board will view this matter sanely and modify its regulations.

The Internal Revenue Department has also had attention called to unreasonable regulations. At the present time when an automobile maker ships a chassis to a dealer he pays 3 per cent tax on it, and the tax ends there. However, when an automobile maker like Cadillac ships a chassis to its agency in New York, although entirely separate from the parent company, the tax is demanded not only on the chassis but also on the body which the agency places on the chassis. The dealer is not asked to pay this tax. The agency is asked to pay it, and this creates unfair competition, as it forces the Cadillac agency, for example, in New York City to pay more than the Cadillac dealer in another nearby city. It is anticipated the Internal Revenue Department will rectify this present difficulty.

Return Load Gains

The matter of return loads on trucks used for rural express purposes is becoming very important, and it is receiving much consideration. The Fuel Administration and the United States Chamber of Commerce have both testified this past week in publicity to the growing importance of the use of motor trucks for transportation and freight and of the use of the return loads plan.

—

Pennsylvania Buys Tractors

WASHINGTON, March 7—The State Safety and Defense Commission of Pennsylvania yesterday appropriated $50,000 to purchase 25 farm tractors to be rented to farmers by the State Department of Agriculture at as low rates as possible. Lieutenant-Governor McClain is chairman of a committee to make the purchases. There will be more tractors purchased after further appropriations are made in the near future.

Trucks End Railroad Congestion

Freight Situation in Hartford Relieved by Co-operation of Mayor and Truck Owners

WASHINGTON, March 4—The Fuel Administration has notified all of its various state divisions of a plan by which Mayor Frank A. Hagerty, Hartford, Conn., took advantage of the recent fuel shut-down order to use motor trucks for improving the freight and fuel situation.

When the fuel order was issued Mayor Hagerty got in touch with the heads of several large industrial plants and proposed that they use as many of their men and trucks for the handling of freight as possible during the idle days. A general invitation was issued to the manufacturers and merchants of Hartford for a meeting the following morning, together with a request that all manufacturers having vehicles suitable for moving freight should volunteer their use, together with men to operate them.

Large Manufacturers Respond

The large manufacturers and merchants responded almost to a man, and at the meeting an executive committee was formed to manage the work. A central office was obtained in one of the banks, telephones installed and comprehensive plans for the work immediately laid out.

Actual work began the following morning. The railroad officials had reported that the congested condition of the railroads had been brought about largely by the fact that consignees had been waiting to have their cars placed on their own private sidings, and that freight was coming in too quickly to permit this. It was therefore decided by the committee that cars would be handled as quickly as possible, and placed on public as well as private sidings. Under the circumstances consignees were not to insist that the cars be placed on private sidings, but to take them wherever they were placed by the railroad.

Handle Own Goods First

The committee also decided that each concern furnishing trucks should devote its attention first to handling its own cars, and, after these were emptied, permit the truck to move other freights irrespective of the consignee. This meant that some freight would be trucked without cost to particular consignees, but the work done was so important that this question was subsidiary.

The railroad made a special effort to place full carloads of freight where they could be reached by trucks. As a result of 2 days' work the 300 freight cars which had been congesting the local tracks were unloaded.

The committee was ready to renew the work on the following Monday, and on each Monday since, but the campaign of the first 2 days was so successful that this was not necessary. The committee is still organized and closely in touch with the local freight situation, so that it may step in at any moment to relieve congestion.

—

Little Relief from Lifting of Embargoes

DETROIT, March 1—The lifting of practically all Michigan and Ohio embargoes has relieved the tight freight situation but slightly. Manufacturers as well as railroads hold that this congestion was caused by the recent most unusual weather conditions, the worst the railroads ever had to fight, and that as long as a car shortage exists there will be no relief for shippers. The government is using so many cars in the transportation of grain, munitions and other necessities of war that only a small percentage of railroad equipment is available for individual shipping requirements. Most of the cars released by the lifting of embargoes went into government use. The Ford Motor Co. reports, however, that this new condition has given it an opportunity to divert to the East and South some of the traffic that was formerly, of necessity, going West, thus making it possible to equalize the distribution of automobiles.

—

Canada Removes Import Duty on Tractors

WASHINGTON, March 4—The Canadian Government has issued an order providing for the free admission of farm tractors until Feb. 7, 1919. The order reads as follows:

"Remission and refund of duty is hereby authorized in respect of traction engines costing not more than $1,400 in the country of production, designed to be moved by steam or other motive power for farm purposes, and parts thereof for repairs; and traction attachments designed and imported to be combined with automobiles in Canada for use as traction engines for farm purposes and parts thereof for repairs."

The duties thereby remitted amount to 27½ per cent ad valorem in the case of imports in the United States, it being assumed that the exemption applies to both the customs release and the war surtax.

—

Gear Manufacturers to Convene

NEW YORK, March 4—Gear Standardization will be the principal subject of discussion at the second annual convention of the American Gear Manufacturers' Assn. to be held at the Green Brier Hotel, White Sulphur Springs, W. Va., on April 18, 19 and 20. The convention will begin with meetings of committees on Thursday morning, April 18. The first session will open at 1:30 with addresses by President F. W. Sinram and a representative of the United States Chamber of Commerce, of which the association has just become a member. The banquet of the association will be held Friday evening.

Plan Rural Express Service

Highway Transport Committee to Establish Routes from Farms to Cities

WASHINGTON, March 4—Considering the shortage of foodstuffs, the greatest problem of the near future, the Highway Transport Committee, headed by Roy Chapin, has worked out a plan for rural express services from farms to cities wherever practical. The committee has made a special study of the conditions in Maryland and the area around Washington, and is arranging for rural express to provide transportation of food for the new 100,000 inhabitants of the Capital.

National Survey Carried On

A national survey has been carried on in co-operation with the Department of Agriculture and the Food Administration. Questionnaires have been sent to farmers and to operators of rural express systems in Maryland and near by and some have resulted in important replies. A blueprint hanging in the office of Roy Chapin shows the complete chart of the service in Maryland, displaying the motor truck routes from Washington to Germantown, Latonville, Redland and Ashton, an aggregate of 93 miles. Seven trucks are used, making a total daily mileage of 286 miles. Out of Baltimore there are 14 such routes, aggregating 1192 miles daily. The good roads of Maryland are one of the factors that stimulated the service there. Maryland has 1500 miles of good roads, of which 300 miles are used for rural express.

The questionnaires sent out resulted in urgent requests by farmers for better roads. Many said they would go out of business if they did not have better roads to help them get their produce to market. The replies also showed that the trucks not only haul the goods to market but help bring other merchandise back to the farmers from the city merchants. As an example of the work done, one man operating rural service brings 400 gallons of milk and cream daily to Washington. Recently he also hauled 827 bushels of wheat to Rockville, Md. He hauled 200 barrels of corn from the field to Washington in 7 days, and his hauls include eggs, poultry, fruit, potatoes and calves, and on his return trip he takes coal and other merchandise back from the city to the farmer.

One farmer near Baltimore reported that in addition to his regular route service the operator in his district also handled for him 100 live hogs, 200 live sheep and 800 bushels of wheat, and brought back to the farm 190 tons of fertilizer, 80 tons of lime, 65 tons of building sand and 70 tons of coal.

One reply showing the importance of the rural express system was from a farmer who said that "without the truck it would take a man and a pair of horses

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2 days to make the trip to Washington and back, which is now made in 3 hours with the truck."

Another reply was to the effect that "I favor the rural express system because labor is scarce and the people in this neighborhood would have to go out of the dairy business without the rural express service, as the railroad station is 5 miles away over a dirt road and the train is due there at 7 a.m."

Chapin, discussing the situation, reported: "Mr. Hoover refers to corn and potatoes rotting because they cannot be moved. Tours through Maryland show exactly that condition because farmers cannot get their produce to railroad stations for shipment."

The Maryland rural express systems are regulated by the public service commission. The State Highway Commissioner of Maryland and the State Highway Commissioner of Virginia are preparing maps and routes showing how Washington can be served as Baltimore is.

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Motor Parcels Post Route in Ohio

COLUMBUS, OHIO, March 2—The first Ohio motor parcels post route has been established by the post office department between Columbus and Zanesville, via Reynoldsburg, Etna, Hebron, Brownsville and Hopewell. This is a distance of about 60 miles. A 2-ton truck, capable of maintaining a speed of 25 miles an hour is being used, and additional trucks will be installed as the volume of business increases.

—

Shipping Maxwells to Lyons Fair

DETROIT, March 4—The Maxwell Motor Sales Corp. received half of the total shipping space allotted for the use of automobiles being shipped to the Third Annual Fair at Lyons, France. In the shipment were 2 truck chassis, 2 touring chassis, 1 town car chassis, 1 sedan, 1 roadster, 1 all-weather top, 5 touring cars with right hand drive and a Chalmers touring car. The freight charges will be as great as the total cost of the cars in this country. The cars will be admitted free of duty unless they remain in France.

—

Interurban Shipments Not Popular

DETROIT, March 4—The few automobile manufacturers who are sending their cars over the Interurban lines are doing so only where it is absolutely necessary. Great difficulty is experienced in the loading of them due to the fact that the electric cars are of the side door type which makes it difficult for the automobiles to enter.

The Buick company does not ship more than 6 cars a week via the electric route. Reo averages 15 carloads a week, and has been using this mode of shipping for 30 days. This form of transportation permits only short hauls; when the terminal is reached the car must either be transferred to another line or proceed on its own power.

G. M. Earnings Are $26,285,951

Equals 34.2 Per Cent on Common—Increase in Profits Since Reorganization

DETROIT, March 6—The report of the General Motors Corp. which succeeded the General Motors Co. on Aug. 1, 1917, shows that the General Motors properties earned undivided profits of $26,285,951 during 1917, after charging off $6,901,889 for war taxes and extraordinary expenditures. This is equal to 34.2 per cent on the $76,873,300 common stock outstanding on Dec. 31.

The undivided profits in the 5 months from Aug. 1 to Dec. 31, amounted to $13,792,983 as against $12,492,968 in the first 7 months of the year. The former covers the operations of the General Motors Corp. and the latter those of the General Motors Co.

The balance sheet as of Dec. 31, shows current assets of $80,275,577, against current liabilities of but $15,524,044, giving a net working capital of $64,751,533. Cash on hand at the end of the year totaled $18,865,645.

Surplus on the common stock amounts to $26,285.951 as against $23,731,952 at the date of reorganization.

Comparison of results for the 1917 calendar year with those of the fiscal years ended July 31, 1917, 1916 and 1915 follows:

	Dec., 1917	July, 1917	July, 1916	July, 1915
Net profits of dep.	$34,634,854	$29,132,542	$29,146,107	$14,926,322
War taxes & ext. exp.	6,901,889	4,053,315	.....	.....
Balance	$27,732,965	$25,079,226	$29,146,107	$14,926,322
G. Mo. prop.	27,389,737	24,780,916	28,789,560	14,457,803
Pfd. divs.	1,103,785	1.048,964	1,048,964	1,048,964
Sur. for com.	*26,285,952	$23,731,952	$27,740,596	$13,408,839

*Equal to 34.2% on $76,873,300 common stock outstanding.

The balance sheet of the General Motors Corp. as of Dec. 31, 1917, compares as follows with that of the General Motors Co. as of July 31, 1917, 1916 and 1915:

ASSETS

	Dec., 1917	July, 1916	July, 1915
Fixed assets of dep.	$38,657,835	$18,366,404	$15,819,851
Patents, agreem., etc.	274,100	355,800	413,500
Misc. invest.	2,030,273	358,428	367,184
Cash	18,865,645	22,436,574	14,526,124
Marketable securities	1,255,000	286,000	1,001,000
Receivables	13,595,538	5,629,633	3,944,680
Inventories	46,559,394	25,100,349	14,049,298
Deferred expenses	854,434	389,630	533,585
Goodwill	11,697,503	7,934,198	7,934,198
Total	$133,789,724	$80,897,019	$58,589,423

LIABILITIES

Preferred stock	$19,676,800	$14,985,200	$14,985,200
Common stock	76,873,300	16,511,783	16,506,783
6% notes	.....	.....	2,328,000
Subsid. stk. and surp.	1,399.583	1,228,458	982,423
Accounts payable	10,665,717	7,264,443	1,380,907
Taxes, payrolls, etc.	4,858,326	2,690,832	1 270 302
Pfd. div. due	196,768	262,241	262,241
Res. for taxes	6,939,018	.....	.....
Res. for contingencies	1,671,818	958,464	888,406
Surplus	11,508,392	36,995,597	19,985,159
Total	$133,789,724	$80,897,019	$58,589,423

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Westinghouse Earnings About 19 Per Cent

PITTSBURGH, March 2—The Westinghouse Electric & Mfg. Co., in its current fiscal year, which ends March 31, 1918, will show aggregate sales of about $90,000,000 or about the same as the 1917 amount. Final surplus of the stock will be less than that of last year, due to war taxes and other factors. Surplus for dividends, after deduction of taxes, will probably amount to between $13,000,000 and $14,000,000, as compared with $18,079,889 last year. This is equivalent to 19 per cent on the total $74,812,650 capital stock outstanding against 24.17 per cent a year ago.

Unfilled orders on the books amount to $130,000,000, exclusive of the machine gun contract which will be filled at the plants of the New England Westinghouse Co. About 60 per cent. of this work is for the Government.

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4616 Dodge Chassis in Army

DETROIT, March 2—Dodge Brothers report that they have 4616 chassis in government service, distributed among the Signal Corps and the Ordnance and Quartermaster Departments. Those in the Signal Corps are constructed with special truck bodies for carrying telephone and telegraph apparatus and laying lines of communication systems. The Quartermaster Department has 4 Dodge chassis fitted with a 2-ton Smith Universal Form-A-Truck attachment, and can be used with either creeper-type or 2-wheel rear drive. So far only four of these trucks have been constructed, and it is expected that these will be driven overland to Detroit shortly.

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Peerless Cars Shipped by Trucks

CLEVELAND, March 4—The Peerless Motor Car Co. sent a shipment of passenger cars from the factory to Baltimore, last week, loaded on Peerless trucks. The cost was approximately the same as freight rates, and the time consumed in delivery was less than that required for express shipment. The cars were crated, mounted on the truck body, and arrived at their destination in perfect condition. Other shipments will be handled in the same manner, and it is planned to start 20 cars immediately for New York and Philadelphia.

—

Signal Corps Needs 10,000 Machinists

WASHINGTON, March 4—The Signal Corps of the War Department has issued a call for 10,000 machinists, mechanics, chauffeurs and other skilled workers. Men registered in the draft may be inducted into this service by applying to the local draft board. Men not registered may enlist at any recruiting station.

—

Ford Assembling Branches on Part Time

MILWAUKEE, March 5—Operation of the assembling plant of the Ford Motor Co. here was greatly reduced on March 1 because of the difficulty in keeping the factory supplied with materials and parts from the main works in Detroit. It is stated that 19 of the 38 branch plants have been placed on a temporary part-time schedule.

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Headlamp Tests for Glare

Illuminating Engineers and S. A. E. Obtain Data on Maximum Necessary Light

NEW YORK, March 6—In order to obtain accurate data which might be the basis for reasonable uniform legislation covering automobile headlamps, the Lighting Division of the Standards Committee of the Society of Automotive Engineers and the Committee on Automobile Headlights of the Illuminating Engineering Society held a series of tests last night. These tests had as their object to obtain reliable data covering the following questions:

1—What amount of illumination is necessary to reveal a person, vehicle or substantial object at distances 150 and 250 ft. ahead of the driver's seat?

2—What is the maximum amount of light which may be allowed to reach the driver's eye from an oncoming car without producing intolerable and unsafe conditions of glare?

For the tests, a special apparatus was designed by the Society of Automotive Engineers consisting of two pairs of regulation headlamps having commercial bulbs, reflectors and plain front glasses. These were connected in parallel in a series circuit consisting of the lamps, an adjustable resistance and an ammeter.

How Tests Were Conducted

The test, for which between 50 and 60 observers volunteered, consisted of adjusting one pair of headlamps, by means of the rheostat, until the observer was just able to pick up the object, which was a man walking across the road at 150 ft. The test was repeated for 250 ft.

The lamps representing an oncoming car, 100 ft. distant, were then turned on, and with the lamps corresponding to those on the observer's car as he had last adjusted them to pick up the object at 250 ft., the observer varied the intensity of the lamps on the oncoming car until such brilliancy was obtained as in his opinion was compatible with safe driving. Readings were taken, giving the current draw, as the observer indicated he had picked up the various objects. These will be translated into foot candles at the objects and the averages obtained will serve as the basis of such recommendations as may be made.

Tests Made Jointly

The tests were made jointly by the two engineering bodies, the committee from the Illuminating Engineering Society comprising Dr. C. H. Sharp, chairman; E. C. Crittenden, P. W. Cobb, E. J. Edwards, C. A. P. Halporson, Jr., W. F. Little and W. A. McKay. The Lighting Division of the S. A. E. consists of M. E. McKechnie, chairman, Paul F. Bauder and Wm. T. Jones.

The tests were made on an unlighted stretch of Pelham Parkway, New York City.

Prohibit Private Flying Except Under License

WASHINGTON, March 5—To protect army camps and naval bases from possible attack by enemy airplane, President Wilson to-day issued an order prohibiting private flying of balloons and airplanes except by license of the Joint Army and Navy Board on Aeronautics. Any aircraft disregarding this proclamation, which does not apply to aircraft operated by the United States Army or Navy, will be considered hostile and fired upon.

—

Baruch Starts Conversion

WASHINGTON, March 7.—Bernard M. Baruch, chairman of the reorganized War Industries Board, has started to convert existing facilities where necessary to new uses as suggested by the President. He will co-operate with Dr. Garfield, Fuel Administrator, and has outlined the industries of the country as regards their importance as follows:

1—Manufacturers of food and similar necessities and the machinery necessary for their industry.
2—War materials and the fuel required.
3—Peace and peace time production.
4—Luxuries.

Mr. Baruch has not yet definitely decided upon a list of the so-called luxuries. Dr. Garfield's control over fuel will withhold from the unnecessary industries the supply of coal, thus automatically compelling war production.

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Another Airplane Mail Route

WASHINGTON, March 7—The Post Office Department has under consideration establishment of an airplane mail route between Washington and Atlanta, Ga., connecting with the several military camps on that route along the lines of the airplane route to be established between New York and Washington.

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Tire Manufacturers in War Conference

WASHINGTON, March 5—Tire manufacturers were called to Washington to attend a conference to-day with the Motor Transport Section of the Quartermaster Corps. It was decided to use the 40 by 6 dual tires on the standardized trucks in preference to the 40 by 10 single tires. This decision was not reached because of any known inferiority of the single tire but rather because of the definitely known qualities of the 40 by 6 dual tire, it being the policy of the Motor Transport Section not to deal with experiment for the present at least.

—

Army Motor Equipment Cost $54,000,000

WASHINGTON, March 2—The motor vehicle equipment for the 33 divisional camps of the United States army cost $54,000,000 according to figures given out here last week. A large part of this sum is paid for trucks. Each division uses 10 light trucks and 343 3-ton trucks. The cost of building repair shops and heating garages during the cold season amounted to $8,700,000.

Call Salesmanship Congress

Third Annual Session to Be Held in Detroit April 24—To Discuss War Problems

DETROIT, March 5—The World's Salesmanship Congress, third annual session, has been called in Detroit, April 24, 25, 26 and 27. The meeting has been called in advance of the usual dates in order to discuss the war questions at present troubling the nation's business men. The part of salesmanship in winning the war will be a prominent feature of the program. The leading speaker will be Herbert N. Casson of London, England, who is especially delegated by England to address the congress. Other speakers have not as yet been announced, but it is assured that the biggest possible men will be secured to discuss the vital points at issue. The following is a list of topics:

"To Win the War, Can the Nation do Without the Individual Business Man?"
"To Win the War, Must Business Earn to Maintain the Nation's Credit?"
"Must the War Be Waged Entirely on Present Savings, Not Earnings?"
"What Businesses are Non-Essential?"
"Is 'Non-Essential Industry' a Recent and Verbal Invention?"
"What Shall We Do with Business, to Win the War?"
"Is Enough Consideration Being Given to the Difficulty of Starting Up a Business that has been Shut Down?"
"Is Enough Consideration being Given to the Fact that We are Preparing for a Temporary, Not a Permanent War?"
"Are Labor and Materials the Only Things that Can Be of Value in Support of Our Fighting Machine?"
"Are Recent Trade Restrictions Affecting the *Spirit* of the Nation?"
"Are We Sentencing Ourselves to a Seat on the Economic Doorstep of the Universe?"
"Is it Illegal and Unpatriotic for Newspapers to Solicit Advertising and Stimulate Sales at this Time?"
"Will the Restrictions of the Magazine-Zone-Legislation Help Business and Help Win the War?"
"Is So-called American Extravagance a National Commercial Asset or Liability?"
"Does the Collapse of the Railroads Argue the Possibility of National Industrial Paralysis?"
"Is it More Patriotic in War Times to Wear Old Clothes?"
"Are the World Nations Going Hopelessly Bankrupt?"
"Can the Nation Keep on Going Bankrupt Indefinitely and Still Carry On?"
"The Projected War Finance Corporation."
"Economic Destruction vs. Economic Security."
"Artificial Restriction vs. Free Play of Supply and Demand."
"Quantity Out-put of Shells vs. Quantity Out-Put of Motor Cars, Safety Razors and Typewriters."
"Winning By Weight of Metal vs. Winning By Weight of Output."
"The Difference between Adjustment and Curtailment."
"The Citadels of Cash, Credit and Commerce."
"Price Fixing."
"War Ends, but Business Never Does."
"An Ounce of Organized Trade Preservation Now vs. a Pound of Ruthless Trade Warfare Later."
"Either We Must have the Biggest National Scrap-Heap Ever Witnessed, or Else We Must Make the Biggest Efforts Ever Recorded in Industrial Organization."
"Individuals, Not Nations, Do Business."
"Shall We Continue to Build, Repair, Borrow, Lend, Buy, Sell, Venture and Trust?"
"The Economic Weapon the Final Factor in the War."
"Making the World Free Not Only for Democracy, but for Trade."
"How England Is Doing It."
"It Can Be Done."

The Sale: First Factor of the Selling Process.
The Man: Second Factor of the Selling Process.
The Ship: Third Factor of the Selling Process.
Preparation: First of Preparatory Steps of the Sale.
Prospecting: Second of Preparatory Steps of the Sale.
Approach and Audience: Third of Preparatory Steps of the Sale.
Sizing Up the Buyer: First of the Presentation Steps.
Gaining Attention and Awakening Interest: Second of the Presentation Steps.
Persuading and Creating Desire: First of the Convincing Steps.
Handling Objections: Second of the Convincing Steps.
Securing Decision and Obtaining Signature: First of the Closing Steps.
The Get-Away and Future Orders: Second of the Closing Steps.

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Plan Strict Policy For Industry

(*Continued from page* 515)

supply of that article is insufficient, either temporarily or permanently.

(6) The making of purchases for the allies.

The chief function of the War Industries Board in the past was to make purchases for the Allies. Hence, these new functions display a considerable broadening of power to include practically complete control of all industries including conservation of existing facilities and resources, creation of new facilities, conversion of existing industries to war work, supervision of purchases not only by the Allies, but also by our various war and navy departments and control of priorities of transportation, of production and of proportions of any articles or materials.

Baruch, at the suggestion of the President, will act "as the general eye of all supply departments in the field of industries." It is expected that the new powers given the board will eliminate competition for supplies between U. S. departments and the Allies, thus centralizing purchasing power.

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N.A.C.C. Out of Committee

(*Continued from page* 514)

action by way of curtailment that might have been taken at that time.

Since the appointment of the committee 472 different jobs in the way of manufacture of war orders have been placed with the manufacturers of automobiles, trucks and accessories and the committee devoted much of its time to the work of bringing Government departments and the automobile industry together. This work approximates $300,000,000 in Government contracts, this figure not including Ford contracts, which are said to range between $75,000,000 and $100,000,000.

The Automobile Industries Committee did good service for the navy in placing $750,000 worth of contracts for small parts, which otherwise would have been difficult to secure.

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Changes in King Personnel

DETROIT, March 6—Changes in the personnel of the King Motor Car Co. gave practically a new staff of executives and also a change in the sales policy of the company. Following the resignation of H. C. Bradfield, the office of advertising manager has been abandoned, and hereafter the advertising will be handled by W. B. Nesbitt, New York. Salesmanship advertising details will be handled by Robert Walsh, who is assistant to Wallace Hood.

W. B. Nesbitt has been elected vice-president and will act as personal representative of Artemus Ward, Sr., who is connected financially with the company, and who, it is stated, recently pledged $500,000 additional capital to the company. Part of this has already been paid in.

H. A. Church has resigned as secretary, and H. D. McCullough, formerly of the Aluminum Castings Co., will succeed him.

—

Re-elect Daniel Willard

WASHINGTON, D. C., March 6—Daniel Willard was re-elected chairman of the advisory commission of the Council of National Defense at the annual meeting of the advisory commission yesterday. W. S. Gifford and Grosvenor B. Clarkson continue as director and secretary respectively of the commission as well as director and secretary of the Council of National Defense.

—

Wright-Martin to Make Planes, Too

NEW BRUNSWICK, N. J., March 6—The Wright-Martin Aircraft Corp., which heretofore has confined its activities largely to the production of engines, and at present is producing an order of 3000 Hispano-Suiza engines at the rate of 10 a day, is to take up the production of complete airplanes. It is understood the company is negotiating for 25 machines to be built at its Pacific Coast plant. Five hundred of the 150 hp. engines have been delivered and preparations are being made to get into production on the larger engines. The company has a contract for 3000 Hispano-Suiza engines of 300 hp. The company is to-day moving its executive offices from 60 Broadway, New York, to the New Brunswick plant.

—

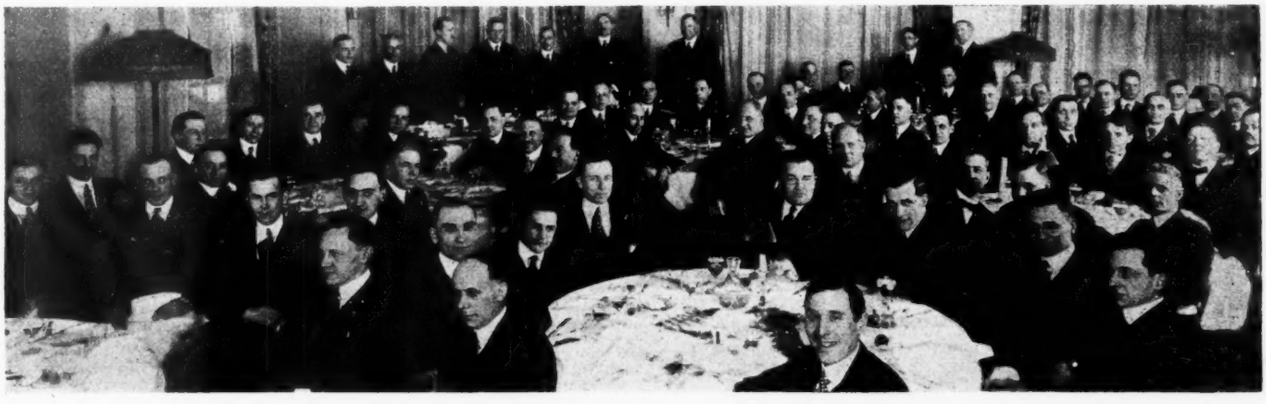
Government Commandeers Platinum

WASHINGTON, March 4—The Government has issued orders through the Council of National Defense for the commandeering, for war purposes, of all crude and unworked platinum in the hands of importers, jobbers and wholesalers. The control will be exercised through the chemical division of the War Industries Board. It is not the intention of the Government to take over and handle directly the present stocks of platinum, but to regulate its shipments by certain conditions. The Secretary of War will fix a price for crude, refined and alloyed platinum, following which notice will be given producers and dealers and blanks issued governing delivery and distribution. The following list indicates in general the order of preference which will be followed in releasing platinum for shipment: No. 1, military needs of the United States Government; No. 2, military needs of Allied governments; No. 3, essential commercial purposes.

—

Standard Parts Holds Sales Convention

CLEVELAND, March 4—The first annual sales convention of the Standard Parts Co. was held in the Hollenden Hotel here Feb. 25, 26 and 27, and was attended by the entire sales organization of the company and many of its executives. The meetings were addressed by President Christian Girl. Director of Sales D. C. Swander was in charge of the gathering. Following the meeting on Monday there was a banquet, and on Wednesday three of the plants of the company were inspected.



First annual convention of sales representatives of the Standard Parts Co., held in Cleveland, Feb. 25 *to* 27

Chamber of Commerce Urges Return Loads

Bulletin Sent to All Local Boards Affiliated with It Calling Attention to Plan and Advocating Its Adoption

WASHINGTON, March 2—The Chamber of Commerce of the United States is issuing a bulletin to all of the boards of commerce affiliated with it in the country calling attention to the return load plan of motor truck transportation. The bulletin reads as follows:

"The motor truck is a part of the transportation equipment in every community. Its use more nearly to capacity will help solve local problems.

"More complete use means loads both ways. A motor truck usually carries a good load to its destination, whether the destination is in the same community or in another city. Too often, however, the truck makes the return trip with no load. Every time this occurs there is waste of at least half the capacity of a truck to do work in transportation.

"Owners of trucks do not wish half the earning power of their vehicles to be lost. Manufacturers and merchants with goods piled up and awaiting shipment do not like to see empty trucks pass their doors. Both need a local clearing-house for information about the trucks that are available and the shipments that are ready, i.e., to bring together loads and empty trucks.

"Such a clearing-house the local commercial organization can easily provide. It will not ordinarily entail any special expense. It will promote co-operation in the community. It will render a very real service for which business men will be thoroughly grateful.

"Return-Load Bureau is a convenient name for a clearing-house. The bureau should ascertain the established lines of trucks that run regularly on fixed routes and the part of their capacity that is not being utilized. It should then obtain information from all owners of trucks used for private hauling, getting statements about the capacity of each truck, how far its capacity is used, between what points the capacity is unused, if the unused capacity can be made available for other persons at a reasonable price, etc. Besides gathering this information, the bureau can make known to everyone that whenever a truck is to make a trip without a load the bureau will respond to a telephone inquiry by endeavoring to give the name of a person who wants to send a load over the route in question. Efforts can be made also to have drivers who bring loads by truck from other points telephone to the bureau in order to get return loads.

"At the same time the bureau can enlist the co-operation of business men who may have shipments to make.

"In order that any driver or other person from out of town may quickly ascertain if there is a return load for him, each bureau should be specially listed in the telephone directory.

"With incidental questions the bureau will not usually need to deal. For example, it can leave the compensation that is to be paid to negotiation between the parties.

"In England return-load bureaus have proved of great assistance. They have been most developed in the United States by commercial organizations in Connecticut. Experience has demonstrated that the assistance they can render is very real and important, and that they can be organized advantageously in many communities where they have not as yet been tried."

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Edmunds & Jones Earns $417,034

DETROIT, March 2—The Edmunds & Jones Corp. earned net profits of $417,034 during 1917, before deduction of war taxes. After the dividends were paid, a surplus of $168,791 remained for the year. The output of lamps from the Detroit plant aggregated 2,798,842 as against 1,897,043 in 1916. The output of the Canadian plant was 338,293. Orders on file in the Detroit plant amount to $800,000. The combined income account of the Edmunds & Jones Corp. and subsidiaries follows:

	1917	1916	Changes
Gross sales profit.	$516,303	$637,278	*$120,975
Other income	112,354	110,545	†1,809
Total income..	$628,657	$747,822	*$119,165
Selling exp., etc..	211,623	185,896	†25,727
Net profit	$417,034	$561,926	*$144,892
War taxes.....	79,908	.....	†79,908
Balance	$337,126	$561,926	*$224,800
Pfd. dividends ...	48,335	51,625	*3,290
Com. dividends..	120,000	120,000	.....
Surplus for year.	$168,791	$390,301	*$221,510

*Decrease. †Increase.

—

Commandeer Spruce for Airplanes

WASHINGTON, March 3—The War Department has given the Aircraft Production Board the authority to commandeer spruce in the northwest wherever it may be found in order to hasten the government aircraft program.

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Scripps Shipping 1918 Cars

DETROIT, March 1—The Scripps-Booth Corp. has made the first shipment of 1918 cars to Pittsburgh and other eastern points. The shipment consisted of 4 carloads, containing 20 cars. Production for 1918 is expected to reach a total of 12,000.

—

Airplane Program Ahead of Schedule

WASHINGTON, March 2—Thirty representatives of airplane and engine manufacturers called to Washington to report progress on the air program told Secretary of War Baker they were abreast of the program and that some of them were ahead of it. With Secretary Baker they went over the program on training, advance training and combat planes. They were addressed at the meeting by the Secretary; Howard E. Coffin, chairman of the aircraft board; Maj. Gen. Squiers and Col. Deeds, of the aviation section of the Signal Corps. Secretary Daniels and Admiral Benson also congratulated them on their splendid progress.

—

Western Carburetor to Increase Output

ALMA, MICH., March 3—The present output of the Western Carburetor Co. is 30 carburetors a day, but this will be increased to 200, as soon as the working force is completed. At the stockholders' meeting held last week, the following officers were elected: President, Albert Frevert; vice-president, George J. Sandel; secretary, Harley Williams, and treasurer, Charles O. Ward. The directors appointed are Albert Frevert, Harley Williams, George Sandel, C. M. Johnson, Chas. O. Ward, P. M. Smith and J. N. Jay.

—

U. S. Truck Adding to Plant

CINCINNATI, March 4—The United States Motor Truck Co. is building a three-story brick and steel structure as a plant addition. It will be one-half block square and serve as a testing department, paint shop and final assembling shop. Later an addition one and one-half blocks square and three-stories high will be built.

—

Airplane Mail Service April 15

WASHINGTON, March 2—Airplane mail service between Washington and New York is to start April 15. Eight machines will be used and a daily schedule of one trip daily each way maintained. Machines probably will land at Van Cortlandt Park in New York. The time for the flight is estimated at 3 hours. A stop will be made in Philadelphia. Each plane it is estimated will carry 300 lb. of first-class mail.

—

General Electric Subsidiary Buys Abbott Plant

CLEVELAND, March 3—The National Electric Lamp Works of the General Electric Co. has purchased the plant and land of the defunct Abbott corporation on East 152nd Street, and the Nickel Plate tracks for a consideration of about $200,000.

The deal includes a one-story building, 110 x 681 ft., and 5½ acres of land. It is stated that the Abbott plant will be used for a machinery building.

—

Spruce Shortage in Germany

WASHINGTON, March 4—Some German airplanes captured and brought to this country reveal that Germany is running short of spruce and is making its wing beams of thin pieces, some of them less than 1 in. in thickness, put together with glue and nails.

—

To Decrease Airplane Accidents

WASHINGTON, March 3—To eliminate the many accidents at flying fields, the aircraft production board has evolved a system whereby pupils will fly in different directions from the camps to points 10 miles distant, and thus avoid collision.

Freight Embargoes Modified

Permits Now Obtainable for Motor Car Shipments Part of the Way to New York

DETROIT, March 2—The embargo placed upon the handling of motor cars by the railroads early in January has been so far modified that permits may now be obtained through the Freight Traffic Commission for a limited number of carloads when freight cars are available. The dealers are taking advantage of this privilege and shipping their cars at least part of the way when possible. Permits are frequently granted as far as Newark, N. J., or Poughkeepsie, N. Y., when they cannot be had for the whole distance.

Factories within driving distance of New York, and so placed that they can use the Lincoln Highway or good state roads, are maintaining a regular drive-away service, usually sending cars or trucks in groups of five or six only on account of the limited hotel accommodations. No regular schedule has been possible yet owing to uncertain weather and the far from perfect condition of even the best roads. In some cases no shipments have arrived since December. Four Crow-Elkhart cars were recently driven through from Elkhart, Ind., to New York, via Pittsburgh, in 5 days. Some have not been so fortunate. It is said that the road from Detroit is crowded, and that many stalled cars and wrecks are passed on the way.

Often as many as 15 or 20 Packard cars and trucks are driven through daily. Wherever possible cars are carried on the trucks. When not enough trucks are included in the day's drive cars are driven also. Little or no attempt is made to use the railroads to the eastern seaboard.

Studebaker is now driving all cars east. The last rail shipment left the factory Jan. 1 and has just arrived. Cars are also driven from New York to purchasers in other cities.

Buicks are driven in groups of five, with a captain for each group, at the rate of 20 cars a day. When possible, some are shipped to Buffalo by boat and by rail from there. The New York branch has a storehouse at Port Huron for its own use and to relieve factory congestion. The Reo company has men constantly on the lookout for possible rail shipments, but expects to drive cars overland as soon as the roads improve.

The road from Detroit to Pittsburgh is none too good. The section between Toledo and Norwalk is the worst, being badly rutted and muddy. From Pittsburgh the Lincoln Highway is followed most of the way, but even that is cut up and very hilly part of the way. Between Princeton and Rahway, N. J., it is not being used at present, a detour being made via Perth Amboy.

The route from Detroit via Cleveland and Buffalo is longer, but east of Buffalo the road is good and the large towns along the entire distance are always available in case of trouble. Roads in the Mohawk Valley, however, are apt to be flooded in the spring. Such a condition is reported now.

—

Michigan Stamping Earns $505,959

DETROIT, March 3—The Michigan Stamping Co. earned $505,959 in 1917. The total sale for the year is $3,419,419. This yielded a percentage of 14.8 per cent profit. As compared with a year ago this is a gain of about 80 per cent when the sales were $1,858,489 with a profit of 13 per cent. The items charged off for depreciation include $42,129 for accounts, $42,306 on the company's old plant, and $32,500 on the new plant. For machinery, fixtures and dies a total of $101,861 is charged.

The balance sheet follows:

Current Assets—		
Cash	$26,584	
Accounts receivable	365,668	
Liberty Bonds	9,350	
Material on hand	701,412	
Prepared expense	14,027	
	$1,117,041	
Investments—		
Building and real estate	$517,079	
Machinery, tools and fixtures	358,265	
Auto trucks and pickup	4,000	
Office furniture	6,598	
Old plant	125,000	
Marketable real estate	232,826	
	$1,243,768	
Total assets		$2,360,809
Liabilities—		
Accounts payable	$134,113	
Bills payable	174,353	
Accrued payroll	7,571	
Deposit on scrap contract	5,000	
Reserve for Federal income and excess profits taxes	150,000	
Steel	178,856	
	$649,893	
Capital stock, com	$1,300,000	
Capital stock, pfd	200,000	
Surplus	210,893	
Total liabilities		$2,360,809

—

Ohio Assn. Meeting Postponed

CLEVELAND, March 2—The annual meeting of the Ohio State Automobile Assn., which was to be held at Lima during the last week in March, has been postponed until the week of May 3. This action was taken by a referendum vote of the members, in order to permit delegates to make the trip by motor car.

—

Germany Building New Airplane

WASHINGTON, March 4—Germany is building a new airplane modelled on the Caproni with three separate engines and to carry one thousand pounds of dynamite. It is anticipated that this airplane will be used for bombing purposes over England.

France to Add 10% Car Tax

Horses Reduced 31% in 3 Years — Trucks and Tractors Tax Exempt

By W. F. Bradley

PARIS, Feb. 11—Under the necessity of raising war revenue the French Government is about to apply a tax of 10 per cent of the purchase price of all articles of luxury. Under this heading are included automobiles of more than 12 horsepower or of purchase price of more than $1,200.

Trucks, farm tractors and touring cars necessary for the use of professional men are excluded.

Used cars have to pay the tax if the price exceeds the limit of $1,200.

Motorcycles are elegible for the tax if their purchase price exceeds $300.

French manufacturers are finding fault with the new fiscal arrangement on account of the low horsepower limit. They maintain that this should be raised from 12 to 16. Their most important stand, however, is made against the principle of classifying an automobile as an article of luxury. They maintain that the vast majority of automobiles are used for utility purposes, and while there may be an element of pleasure in the use of an automobile that is only an incidental in the great movement.

It is pointed out that owing to the war the number of animals is being reduced at an alarming rate. Between 1913 and 1916 the number of horses dropped 31 per cent; donkeys and mules, 14 per cent; oxen dropped 30 per cent, and cows 20 per cent. The official figures showing the number of cattle in France on these two dates are as follows:

	1913	1916
Horses (more than 3 years old)	2,550,000	1,682,000
Donkeys and mules	544,000	470,000
Oxen	1,843,000	1,260,000
Cows	7,794,000	6,200,000

In order to meet these losses gasoline tractors and automobiles will have to be used on the land in a measure altogether unknown prior to the war. While it is not proposed to tax this agricultural machinery, it is impossible to put a tax on any one branch of the automobile industry without affecting the whole.

The matter is also being looked upon from a national standpoint, for France possesses, in the hands of private owners, 160,000 automobiles of a capital value of $320,000,000. These 160,000 are made up of 115,000 privately owned touring cars paying direct taxation, 15,000 taxicabs and others paying indirect taxation, and 30,000 commercial vehicles not subject to taxation. Motorcycles are not included in these figures.

Until the outbreak of the war France occupied the position of leading automobile export nation of the world, and her manufacturers are anxious that there shall be no system of taxation which

shall handicap her in the keen competition which will take place when the war is over. In 1913 the French automobile export business stood at $45,600,000; America came second with $33,000,000; England third with $28,000,000; Germany fourth with $21,600,000, and Italy fifth with $7,200,000.

—

Aluminum Price Fixed at 32 Cents

WASHINGTON, March 4—The price of aluminum has been fixed by presidential proclamation at 32 cents per pound; last month the metal reached its lowest price during the past year, when it touched 36.4 cents, the average for the year being 51.59 cents and the high figure 60.77 cents. The fixing of the price has been made after investigation by the Federal Trade Board as to cost of production, and is the result of an agreement made with the producers. The price is subject to revision June 1. The new price is to cover lots of 50 tons and over of ingots of 98 to 99 per cent grade. The usual stipulations that producers shall maintain production, not reduce wages, sell to the Allies and the public at the same figure and prevent the metal from falling into the hands of speculators are made.

Most of the aluminum produced in the United States comes from Georgia, Alabama, Arkansas and Tennessee, these four states producing 425,359 tons of bauxite, from which the metal is extracted. A limited amount of cryolite ore comes from Greenland and Iceland. Following are production figures:

1916		1917	
Tons	Value	Tons	Value
63,000	$33,900,000	*80,000	$45,882,000

*Approximate.

—

MacMullen Chevrolet Sales Manager

FLINT, MICH., March 4—John S. Collins has resigned as sales manager of the Chevrolet Motor Co. He will be succeeded by B. J. MacMullen, who was sales manager of the Chevrolet Motor Co. of Texas, with headquarters at Fort Worth.

20 Per Cent Drop in Exports

January Amount $2,097,633 Less Than December—More Trucks Shipped

Mos.	Cars	Value	Trucks	Value	Parts
Jan.	4,325	$3,841,871	1,156	$3,328,870	$2,665,278
			1917		
Dec.	6,442	5,375,706	825	1,585,481	4,952,465
Jan.	4,733	3,860,224	1,340	3,515,210	2,194,312

WASHINGTON, March 6—Exports of automobiles, commercial vehicles and parts, not including engines and tires, from the United States, amounted to $9,816,019 in January. This is $2,097,633 or 18 per cent less than the December amount, the record month of the year; but $447,273 or 5 per cent more than the January, 1917, amount.

There was a great reduction in the number and value of passenger cars shipped, practically every foreign country purchasing less than half of its December amount. France received only 19, as compared with 285 in December. Canada's allotment was 692, compared with 1852 in December. New Zealand alone increased its orders, the January number being 221 and the December number only 71.

The cars sent to the United Kingdom are much higher priced than those sent to Canada, the average cost being $3,500 for the former, and $800 for the latter.

There was an increase in the number of trucks exported. The December figure was 825, and in January 1156 were shipped. This gain is due to a shipment of 622 trucks to France. Truck shipments to other countries remained practically the same.

The value of parts, exclusive of engines and tires, exported decreased from $4,952,465 in December to $2,665,278 in January.

—

Reo Completes First Holt Tractor

LANSING, MICH., March 4—The Reo Motor Car Co. has completed the first of the Holt caterpillar tractors for a government order recently receiyed. The order calls for 3000, and the sample tractors just completed have been passed by Lieutenant H. C. Shafer of the Ordnance department, who is in charge of inspection in Lansing.

The Reo company will assemble tractors for the government during the next 60 days on a large production scale. The first 3000 of these to be turned out by the Reo company are but a forerunner of larger contracts to follow. It is planned to motorize the entire ordnance department, and this will keep the motor car factories working on a chain of contracts.

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B Truck Parts Delivered

WASHINGTON, March 7—Up to this time complete sets of parts for the Class B truck to the number of 210 have been delivered to the fourteen factories engaged in their assembly. It is expected that 1000 complete sets of these parts will be delivered by April 1, following which there will be a steady production with the schedule completed sometime in July.

—

Fisher Body Earns $999,826 in 3 Months

DETROIT, March 4—The Fisher Body Corp. reports earnings and income from all sources of $999,826 for the quarter ending Jan. 31, 1918. After $42,611 is deducted for interest on the floating debt, but before income and excess profits taxes are deducted, a surplus of $957,015 remains.

The consolidated income account for the 9 months from May 1 to Jan. 31, 1918, shows total earnings and income from all sources of $2,809,645. Interest on the floating debt reduces this to $2,697,925.

—

Maxwell Establishes Central Warehouses

DETROIT, March 6—The Maxwell Motor Sales Corp. has established warehouses in Buffalo, Indianapolis, Cincinnati and Chicago, and expects to establish one in Pittsburgh, where the company plans to drive 200 cars each month.

Exports of Automobiles, Trucks and Parts for January and 6 Previous Months

	January				Seven Months Ending January			
	1918		1917		1917		1918	
	No.	Value	No.	Value	No.	Value	No.	Value
Passenger cars	4,325	$3,841,871	4,733	$3,860,224	34,080	$28,702,545	33,531	$25,351,131
Commercial cars	1,156	3,328,870	1,340	3,315,210	8,317	22,635,150	10,113	28,722,972
Parts	.....	2,665,278	.....	2,194,312	.....	19,335,816	.....	14,650,217
	5,481	$9,816,019	6,073	$9,369,746	42,397	$70,673,511	43,644	$69,024,320

BY COUNTRIES, 1917-1918

	Passenger Cars		Trucks		Passenger Cars		Trucks	
France	19	$49,324	622	$2,175,899	677	$756,498	2,010	$7,238,241
Norway	3	10,504	.....	.....	89	94,066	.....	.....
Russia in Europe	4	1,720	2	5,454	492	1,136,400	366	1,480,303
United Kingdom	50	173,475	237	729,920	670	1,400,027	3,994	10,917,148
Canada	692	561,107	81	97,103	6,750	4,959,356	483	622,324
Cuba	318	406,313	.....	.....	2,241	2,090,610	.....	.....
Argentina	84	72,864	.....	.....	2,540	1,775,476	.....	.....
Chile	272	268,094	.....	.....	2,610	2,539,183	.....	.....
British India	4	2,672	.....	.....	32	28,602	.....	.....
Dutch East Indies	47	65,644	.....	.....	1,137	1,160,489	.....	.....
Russia in Asia	.....	.....	.....	.....	5	8,425	.....	.....
Australia	931	685,065	.....	.....	2,978	2,302,204	.....	.....
New Zealand	221	138,138	.....	.....	1,260	970,392	.....	.....
Philippine Islands	135	133,208	.....	.....	762	660,278	.....	.....
British South Africa	231	167,933	.....	.....	1,709	1,334,450	.....	.....
Other Countries	1,314	1,105,810	214	320,494	10,128	7,486,087	1,464	2,377,134

These warehouses will serve as central stations for certain sections of the country and freight deliveries will be made from them.

The Maxwell drive-away system has been organized on an extensive plan. Last week between 600 and 700 vehicles, mostly loaded trucks, left the factory for Ohio, Illinois, Indiana and a number of eastern points, particularly the southern section of Pennsylvania.

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Woods Lieut. Colonel in Signal Corps

WASHINGTON, March 5—Arthur Woods, former Police Commissioner of New York City, has been appointed Lieutenant Colonel in the Air Section of the Signal Corps.

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Ordnance Base to Have Repairshop

WASHINGTON, March 6—The ordnance base costing $25,000,000 which is being erected in France will include a motor vehicle repair plant capable of overhauling 1200 vehicles a month. Four hundred and fifty officers and 16,000 men will be required for the entire base.

—

650 Townsend Tractors in 1918

JANESVILLE, WIS., March 5—The Townsend Mfg. Co., maker of oil tractors and engines, will increase its output to 650 or 700 tractors for 1918. Several plant additions are being erected to increase facilities for production.

Gain in New York Exports

72 Per Cent of Total Shipments of United States Sent Through This Port

NEW YORK, March 6—Exports of automobiles, trucks and parts from this port during January amounted to $7,021,661, or 72 per cent of the total exports from the United States.

The shipments to Canada were made by railroad, not one car being shipped there from the port of New York. Few cars are sent to the Far East from New York, none being shipped to the Philippine Islands, Dutch East Indies or British India, although all received a goodly number from the United States during January.

Australia's cars, on the other hand, came mainly from New York, 851 of the total 931 being sent via this port. Shipments to South America vary. Ninety per cent of the cars sent to Chile went through New York, but half of Argentina's cars were either sent overland or shipped from another port.

There was a slight gain in New York exports over the December amount.

—

Fourteenth Packard Train Starts

DETROIT, March 1—The Packard Motor Car Co. yesterday started eastward its fourteenth army truck train since Dec. 14. This is made up of 30 trucks, some of them loaded with Packard and Dodge parts. In a short time army truck trains will carry capacity loads of steel ranges for the army cooks.

Last week a driveaway of 36 Packard twin sixes and trucks left the factory Seventeen of the trucks had mounted on them either another truck or a passenger car. The train is expected to complete its run of 780 miles in 12 days. The route will be the same as that traversed by the army trains as far as Gettysburg, where the train will switch to a more northerly course to New York.

—

Cars, Trucks and Tractors at Indianapolis Show

INDIANAPOLIS, March 4—The seventeenth annual show of the Indianapolis Automobile Trade Assn., which closed yesterday, was the most successful exhibit in the history of the organization, and included displays of cars, trucks, tractors and accessories. Dealers say that more prospective buyers attended than in former years. The show was held in the industrial plant of the Diamond Chain & Mfg. Co., and 48,000 sq. ft. were devoted to exhibits.

There were 258 displays, including 38 makes of passenger cars, 20 of trucks and 11 of tractors. The latter appealed chiefly to the numerous rural visitors who attended the show. It is predicted that the demand for tractors will be so heavy that dealers will be unable to supply it.

—

100,000 Men in Flying Section

WASHINGTON, March 5—One hundred thousand aviators and mechanics now form the flying section of the Signal Corps. More than 5000 fliers have been graduated from the ground schools in this country and 5000 are now taking the course. More than 10,000 additional students are awaiting an opportunity to enter the schools.

—

Elgin Assets $1,035,906

CHICAGO, March 2—The balance sheet of the Elgin Motor Car Co. for the fiscal year ending Dec. 31, 1917, shows assets of $1,035,906. The full quota of cars will be built by the company in 1918.

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Carlton, Bosch Chicago Manager

SPRINGFIELD, March 1—Lee C. Carlton, for the last 17 months manager of the San Francisco branch of the Bosch Magneto Co., is now manager of the Chicago branch, succeeding W. Norman, who has been appointed factory manager at Springfield, Mass.

—

Report Liberty Plane Flies Over Capital

WASHINGTON, March 5—Although it is impossible to secure confirmation from the Aircraft Board or the Signal Corps, there are fairly substantial reports that a Curtiss airplane which flew

Automobile, Truck and Parts Exports from New York for January

Country	Passenger Cars (No.)	Passenger Cars Value	Commercial (No.)	Commercial Value	Parts Value
Argentine	44	$44,895	1	$5,000	$532,513
Australia	831	589,057	...	....	43,300
Barbados	1	800	...	....	3,020
Bolivia	....	....	...	....	190
Brazil	228	144,030	6	2,560	26,539
British East Africa	....	....	...	....	58
British Guiana	3	3,091	...	....	2,079
British Indies	....	....	...	....	15,044
British South Africa	231	167,933	5	6,765	57,214
British West Africa	50	21,951	2	1,276	11,603
British West Indies	8	4,295	1	600	1,007
Canary Islands	2	730	...	....	654
Chile	271	267,031	...	....	6,862
Colombia	13	11,691	...	....	5,489
Costa Rica	....	....	...	....	283
Cuba	139	122,518	21	50,251	54,259
Danish West Indies	3	2,285	...	....	100
Dutch East Indies	....	....	...	....	49
Dutch Guiana	....	....	...	....	127
England	50	173,475	237	729,920	582,401
France	19	49,234	622	2,175,899	293,610
French Guiana	1	331	...	....	177
French West Indies	7	5,744	...	....	2,063
Ecuador	....	....	...	....	620
Guatemala	2	3,412	1	322	1,319
Haiti	19	7,247	...	....	2,474
Honduras	3	2,100	...	....	248
Italy	....	....	6	4,300	12,122
Jamaica	24	16,961	3	1,125	9,337
Japan	31	38,104	...	....	7,019
Mexico	4	4,800	...	....	1,949
Newfoundland	4	3,525	...	....	670
New Zealand	2	4,401	...	....	30,406
Nicaragua	4	2,494	...	....	40
Norway	3	10,504	...	....	332
Panama	16	14,871	1	265	5,211
Paraguay	1	2,500	1	875	49
Peru	66	66,907	...	....	4,627
Port Africa	....	....	...	....	2,637
Portugal	111	131,160	3	6,666	7,602
Russia (Europe)	4	1,720	2	5,454	....
Russia (Asia)	....	....	...	....	198
Salvador	2	3,300	...	....	1,480
Santo Domingo	25	9,985	...	....	753
Siam	....	....	...	....	130
Spain	184	193,561	...	....	27,554
Straits Settlement	....	....	...	....	2,750
Trinidad	9	5,206	1	600	3,339
Uruguay	101	48,994	...	....	10,912
Venezuela	....	....	1	2,500	5,266
Total	2,691	$2,287,283	922	$3,013,204	$1,721,174

over Washington yesterday was fitted with a new Liberty engine. It is expected that several airplanes equipped with Liberty engines will be stationed at the hangar, near the Washington Navy Yard, and that flights over the city will be frequent.

Newspaper reports that four Liberty airplane engines are being tested in the basement of the Union Depot here are incorrect. The rumors are due to tests of the Liberty motor trucks made in the basement of the Union Depot. It is reported, however, that the Liberty airplane engine has been given thorough tests in an especially constructed room at the Bureau of Standards.

—

Photograph Government Employees

DETROIT, March 4—In accordance with the request of the Government, the heads of all industrial establishments with their employees must be photographed and listed for identification. The work has just been completed at the Ford factory, where every one from Henry Ford down was photographed by the official photographer. Five photographs, it is understood, are to be made of each man. Each man is to be known by a number and when photographed he must carry his number on his chest. Two of the photographs are to be retained by the employer, one by the Government, one by the police and the other serves as an identification card for the man.

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Parachutes for Dropping Mail

WASHINGTON, March 2—The Post Office Department is considering a scheme for dropping mail from airplanes by parachute in connection with the proposed airplane mail service between New York and Washington.

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U. S. to Have 4 Aviation Departments

WASHINGTON, March 5—The United States has been divided into 4 aviation departments. The eastern department will have headquarters at Governor's Island; the southeastern department headquarters will be at Atlanta; those of the southern department will be at San Antonio, and of the western and central department at Chicago. An aviation officer with rank of brigadier-general will be placed in charge.

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Cannot Control Price of Patented Articles

WASHINGTON, March 5—The prices of patented articles cannot be controlled by the patentee according to a decision just rendered by the Supreme Court. This interpretation of the patent laws was made by the court in answering questions certified by the lower courts in injunction proceedings restraining the Boston Store, Chicago, from selling records in violation of a contract made with the American Gramophone Co. for less than list prices. The opinion affects retail dealers bound by similar contracts in which the resale price is fixed by the manufacturer.

Earns 49 Per Cent on Common

Kelly-Springfield Shows Profits of $4,323,955 in 1917—30 Per Cent More Than 1916

CLEVELAND, March 6—The Kelly-Springfield Tire Co. earned gross profits of $4,323,955 in 1917, an increase of 30 per cent over 1916. After deduction of preferred dividends but before deduction of war taxes, this amounts to $12.40 a share on the common stock ($25 par). After deducting dividends, interest and reserve for sinking fund and profit sharing, a surplus of $1,453,585 remains. This is 50 per cent more than the surplus of $957,571 on Dec. 31, 1916.

Assets totaled $15,395,835 and current liabilities amounted only to $1,273,701, leaving a net working capital of $14,122,134.

Following is the income account for 1917, as compared with that of 1916:

	1917	1916
Gross profit	$4,323,955	$3,464,459
Operating expenses	1,720,335	1,404,388
Net operating income	$2,603,620	$2,060,071
Other income	45,293	57,243
Net income for year	*$2,648,913	$2,117,314
Preferred dividends	213,078	215,932
Common dividends	785,152	735,316
Interest	.....	10,800
Sinking fund	75,164	85,964
Profit sharing	121,934	111,731
Surplus	$1,453,585	$957,571

*After $213,078 preferred dividends, the balance of net income was equal to $12.40 a share on $4,907,200 common stock ($25 par).

The balance sheet as of Dec. 31, 1917, compares as follows:

ASSETS	1917	1916
Cash	$772,448	$983,512
Notes receivable	195,917	52,732
Accounts receivable	1,552,431	1,850,585
Bond sinking fund	.....	147,851
Inventories	3,760,162	2,218,142
Preferred stock sinking fund	.....	.....
Deferred charges	52,189	22,374
Liberty bonds	272,353	.....
Plant, goodwill, etc.	8,781,776	7,887,357
Treasury stock	.....	.....
Stock purchased	*8,560	.....
Total	$15,395,835	$13,162,552
LIABILITIES		
Preferred stock	$3,509,300	$3,593,300
Second preferred stock	.....	.....
Common stock	4,907,200	4,907,200
Notes payable	600,000	.....
Accounts payable	235,752	187,911
Debt bond sinking fund	.....	270,000
Reserve for taxes, payroll, etc.	78,961	98,328
Preferred dividend payable	52,639	53,899
Interest payable	.....	10,800
Loan pay—Liberty bonds	231,185	.....
Stock and bond redemption fund	75,164	233,815
Miscellaneous liabilities	.....	350,559
Surplus	5,705,633	3,456,740
Total	$15,395,835	$13,162,552

*Represents difference between $484,960 common stock purchased for resale to employees and $476,400 special loan which will be self-liquidating by employees' instalment payments under stock profit-sharing plan.

—

Michigan Copper Earns $60 a Share

DETROIT, March 2—Net earnings of the Michigan Copper & Brass Co. for the year ending Dec. 31, 1917, were $596,819.41, amounting to $60.20 a share. The company has declared a 3 per cent dividend, payable April 1 to stockholders of record March 15.

The following directors were elected at the recent stockholders meeting: David M. Ireland, James T. Whitehead, Hal H. Smith, Alonzo P. Ewing, Bernard G. Koether and W. B. Wallace, all of Detroit; C. S. Mott and Walter P. Chrysler, Flint; Alfred P. Sloan, Jr., New York. The officers were re-elected by the directors.

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Higrade Motors Ready for Production

HARBOR SPRINGS, MICH., March 4—The Higrade Motors Co. is ready to start production. A preliminary schedule of 25 cars has been arranged and materials are now at hand for these. The materials for another 100 cars are practically all in and indications are that a producton of from 20 to 25 of the light trucks will soon be made weekly. According to present indications this production will start about March 1.

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Maxwell Changes Coast Distributer

LOS ANGELES, March 3—The Southwest Motors has been appointed southern California Maxwell distributer. The move has occasioned considerable surprise among dealers. Up to the present time Maxwell has been handled by the Lord Motor Car Co., which has had the line for the last 5 years. The Southwest Motors was organized less than a year ago and is occupying part of the building erected for Harold L. Arnold.

—

Federal Reduces Shipping Space

DETROIT, March 4—The Federal Motor Truck Co. has succeeded in knocking down its Class B army truck to such a degree that when it is boxed for overseas shipment it will occupy only half the space it formerly used, thus saving 50 per cent shipping space. This box is of the smallest proportions any manufacturer was able to attain in knocking down a truck of this capacity, and it is believed the Government will accept this as a standard.

—

Warner Trailers for Ammunition Trains

BELOIT, Wis., March 2—The Warner Mfg. Co. has for the past three months been working on a government contract for heavy-duty Warner trailers, to be used in ammunition trains. They are a standard type Warner 4-wheel model, and follow regular specifications except that U. S. Standard pintle-eye is used in place of the Warner ball and socket hitch.

—

Aerial Repair Base in Cleveland

CLEVELAND, March 4—The Government will establish an aerial station here, not as a training station, but as a supply and repair base for government airplanes, which are making test flights. Alva Bradley, chairman of the airplane committee of the Cleveland Chamber of Commerce, is arranging for a site and the erection of hangars and machine shops. He has appointed sub-committees to assist him.

Summer Business in Argentina Good

Uncertainty of Export Conditions and Movement of Crops Holds Back Sales Slightly

BUENOS AIRES, ARGENTINA, Jan. 30—Business during the summer which is just closing has been very satisfactory, although the number of cars sold by some dealers has not been as great as was expected. The wheat crop is good, but there is much uncertainty surrounding its movement on account of the Argentine attitude towards the Allies. This, together with the uncertainty about export conditions, is holding up what would otherwise be a good selling period throughout the country. It is very possible that the import tax on automobiles will be increased 25 per cent. This will apply to tires, parts and accessories, and will make sales more difficult.

The great loss of horses due to the war is bound to stimulate the sale of motor trucks, but such developments are coming slowly in this country. Road conditions are not favorable for truck use.

The continuous railroad strikes, in which practically all of the railroads of Argentina were concerned, entirely stopped shipments, and automobile sales were very much affected for several months. They are beginning to recover from this setback.

Practically all of the business here is with American cars, although there still are some European machines of such makes as Fiat, Mercedes, etc., which have not been sold, some of them since before the start of the war, and the Fiats since the time Italy entered the war. Nobody cares to buy these cars because they fear they cannot get spare parts for them.

There is a general feeling that the question of the 56-in. tread in Argentina has not yet been solved, due to the feeling that the farmers in the country want the wide treads, but are obliged to buy 56-in. treads. There is a strong feeling that as soon as the war is over some European factories will furnish models with the 62-in. tread.

A few Buenos Aires dealers have been manufacturing bodies for high-priced American cars, the Cadillac being an example. Fehling Bros. have been building bodies in their own shops, due to the high shipping expenses and also shortage of ocean tonnage.

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Compute Cost of Drive-Aways

WASHINGTON, March 2—Statistics of the cost of drive-aways from Michigan to the Capital have been compiled by dealers here. An Oakland car drive-away from Pontiac requiring 5 days, and covering 600 miles, cost $70. A Hupmobile drive-away from Detroit averaged $85 a car and required 6 days, the increased time and expense being due to weather conditions. Several Federal trucks made the trip from Detroit in 12 days, at a cost of $130 per truck.

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Drive-Aways for 75 Per Cent of Paige Production

DETROIT, March 4—The Paige-Detroit Motor Car Co. is reorganizing its drive-away system so that 75 per cent of its production can be sent overland. The company is driving away only 20 per cent.

Great Reduction in London Traffic

Only 25 Per Cent of What It Was 3 Years Ago—Motor Industry Quiet

LONDON, ENGLAND, Feb. 6—London traffic to the motorist who has not been here for several years does not exceed 25 per cent of what it was 3 years ago. Despite the fuel difficulties there are many more motor vehicles on the streets than horse vehicles, and only a comparatively small number of vehicles driven by the gas bags.

Here the automobile industry is extremely quiet and there seems to be very little in the way of after the war schemes, although it is certain that there will be some high protective measures in force for several years after peace is signed. Just at the present all of these after the war measures as relating to the automobile industry seem to be entirely shelved, and the whole country is engrossed in the one thought of winning the war. The manufacturers appear to be relying entirely on either the continued prohibition of imports of motor vehicles or a very high tariff.

There is very great interest in the American aviation program, and the Liberty engine is looked forward to being one of the important factors in the war.

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Regal to Make Shells for Government

DETROIT, March 2—The Regal Motor Car Co. has received a government contract for the manufacture of 300,000 3-in. shells. These will be made at the Jamestown, N. Y., plant.

Automotive Securities Quotations on the New York and Detroit Exchanges

	Bid	Asked	Net Ch'ge
*Ajax Rubber Co	53	55	—2½
*J. I. Case T. M. Co. pfd	82	86	+1
Chalmers Motor Co. com	5	8	+ ½
Chalmers Motor Co. pfd	30	40	..
*Chandler Motor Co	85	89	—2
Chevrolet Motor Co	118	120	—9½
*Fisher Body Corp. com	26	33	+3
*Fisher Body Corp. pfd	80	87	..
Fisk Rubber Co. com	50	53	..
Fisk Rubber Co. 1st pfd	98	103	..
Fisk Rubber Co. 2nd pfd	70	75	..
Firestone Tire & Rubber Co. com	96	98	..
Firestone Tire & Rubber Co. pfd	98	100	— ½
*General Motors Co. com	116	118	—8½
*General Motors Co. pfd	83	85	..
*B. F. Goodrich Co. com	43½	45½	+3
*B. F. Goodrich Co. pfd	94	100	..
Goodyear Tire & Rubber Co. com	136	139	—1
Goodyear Tire & Rubber Co. pfd	99	100	..
Grant Motor Car Corp	2	3	..
Hupp Motor Car Corp. com	3	3¼	+ ¾
Hupp Motor Car Corp. pfd	78	83	+3
International Motor Co. com	16	19	+2
International Motor Co. 1st pfd	40	45	..
International Motor Co. 2nd pfd	16	20	+3
*Kelly-Springfield Tire Co. com	46	47	—1
*Kelly-Springfield Tire Co. 1st pfd	77	85	+5
*Lee Rubber & Tire Corp	15	16	..
*Maxwell Motor Co., Inc., com	28	29	+ ½
*Maxwell Motor Co., Inc., 1st pfd	60	63	..
*Maxwell Motor Co., Inc., 2nd pfd	22	24	—1
Miller Rubber Co. com	133	137	—3
Miller Rubber Co. pfd	95	98	..
Packard Motor Car Co. com	93	98	—6
Packard Motor Car Co. pfd	92	95	+2
Paige-Detroit Motor Car Co	19	21	+2
Peerless Truck & Motor Corp	17½	18½	..
Portage Rubber Co. com	111	113	—2
Reo Motor Car Co	17	19	..
*Saxon Motor Car Corp	9½	10½	— ½
Standard Motor Construction Co	12	13	..
Standard Parts Co	65½	69½	+1½
*Stewart-Warner Speed. Corp	54½	56½	—1½
*Studebaker Corp. com	47½	48½	—3½
*Studebaker Corp. pfd	93	96	..
Swinehart Tire & Rubber Co	..	35	..
United Motors Corp	25⅜	25½	+3⅛
*U. S. Rubber Co. com	46½	58½	+1
*U. S. Rubber Co. pfd	98	103	+1
*White Motor Co	42½	43½	—1½
*Willys-Overland Co. com	18	19	— ¼
*Willys-Overland Co. pfd	80	82	+1

*At close March 2, 1918. Listed N. Y. Stock Exchange.

OFFICIAL QUOTATIONS OF THE DETROIT STOCK EXCHANGE

ACTIVE STOCKS

	Bid	Asked	Net Ch'ge
Auto Body Co	..	8½	..
Bower Roller Bearing Co	..	18¾	..
Chevrolet Motor Co	119	121	—13
Commerce Motor Car Co	6¾	..	..
Continental Motor Co. com	5⅝	5⅞	— ⅜
Continental Motor Co. pfd	..	..	..
Edmunds & Jones com	..	..	..
Edmunds & Jones pfd	..	..	..
Ford Motor Co. of Canada	216	229	+4
Hall Lamp Co	..	..	..
Michigan Stamping Co. com	13	14¼	— ¼
Motor Products	..	..	..
Packard Motor Car Co. com	..	100	..
Packard Motor Car Co. pfd	90¼	..	—2
Paige-Detroit Motor Car Co	19⅜	20	+ ¼
Prudden Wheel Co	12	14½	..
Reo Motor Car Co	17¼	17⅝	—1½

INACTIVE STOCKS

Atlas Drop Forge	..	30	..
Kelsey Wheel Co	83	90	..
Regal Motor Car Co	..	26½	..

Industrial Review of the Week

A Summary of Major Developments in Other Fields

Divergent Interests Among Iron Producers

NEW YORK, March 6—The New York conference of iron and steel manufacturers on March 1, attended by about 75 representatives of the industry, brought out plainly the divergent interests of large and small producers, as affected by Government prices. While the Steel Corporation and some of the larger independent companies would probably accept without complaint a continuance of present prices, smaller producers in several lines, notably plates, show advances in cost on which they contend strongly for higher Government prices after March 31.

The increased costs of some large companies were as much as $6 a ton between Dec. 31 and Jan. 31, and when account is taken of to-day's restricted scale of operations the increase since the first announcement of Government prices late in September is put in some cases as high as $10 a ton.

For the Washington conference with the War Industries Board, which will probably be in the third week of March, various manufacturers are preparing individual statements showing the reduced profits of recent operations and the prospect of a very considerable falling off in 1918 from the results of 1917.

Consumers of iron and steel have thus far taken no steps to have their varied interests represented at Washington. There has been some agitation on behalf of Northern users of Southern pig irons for a reduction in such irons so that they may be had at delivered prices comparing with those of Northern irons.

What is increasingly commented on in the trade is the small volume of buying for uses having no connection with the war. Some forms of finished steel may become quite plentiful.—*Iron Age.*

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Roads Bad For Drive-Aways

NEW YORK CITY, March 6—It will be nearly a month before all of the main highway between Buffalo and Albany, which is the route over which war trucks are being driven from the Pierce-Arrow factory to seaport, will be free of snow and in ideal condition, according to R. H. Johnston, New York manager of the White Co., who made an investigation trip over the route from New York City to Albany and thence west as far as Little Falls. Due to snow on the road between Albany and Little Falls, 80 miles, it took longer to make this distance than the 150 miles up the east side of the Hudson from New York City to Albany.

Through the Mohawk Valley which stretches westward from Albany the snow is still 6 to 12 inches deep and there are frequent drifts with snow 4 to 6 feet deep. The men driving war trucks through have literally cut channels through these drifts, and if it had not been for their work it would still be impossible to get through with a touring car. The road is filled with deep ruts which constantly weave from side to side of the highway.

Long before Mr. Johnston reached Little Falls, however, he had decided that the driving of cars and trucks over this route for delivery to customers is quite out of the question at this time. Cars and trucks can be brought through but the inevitable damage to the finish of passenger cars and the wear on tires of trucks would be more than the customer would reasonably expect. Possibly, one week from now, or two weeks from now, conditions will be much improved, but the present conditions, as we see them, make advisable some postponement of "drive-aways."

A New Service

Herewith AUTOMOTIVE INDUSTRIES *supplies for the benefit of its readers a general summary of important developments in other fields of business. This is rendered possible by the editorial co-operation of leading industrial publications which are recognized authorities.*

By compressing the general industrial situation into this form we hope to give our readers a clear and comprehensive idea of up-to-the-minute developments which they could otherwise secure only with considerable expenditure of time and effort.

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Harding Director of Wagner Axle

ANDERSON, IND., March 6—H. P. Harding, formerly president and general manager of the Wagner Axle Company, manufacturers of the Liberty Worm Drive Axle, Anderson, has resigned, and G. D. Yaeger has been elected by the board of directors of the company to the office of general manager, in addition to secretary and treasurer, and has now taken up the added duties of general manager.

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Changes in Whitman & Barnes Sales Department

AKRON, OHIO, March 6—A. B. Hall, vice-president of the Whitman & Barnes Mfg. Co., will have charge of the company's sales. R. S. Carter, district representative in Pittsburgh, has been promoted to sales manager, and will have direction of the Twist Drill and Reamer sales. H. E. Fisher, formerly with the Pittsburgh Model Engine Co., will succeed Carter as mechanical engineer, with charge of sales in the Pittsburgh district. Paul E. Thomas is sales manager in charge of the department of wrenches and spring cotters.

Country Laying Plans for Next Season's Coal

A sure sign that fuel troubles are almost over for the present is evidenced by the fact that the country as a whole is now laying plans for next season's requirements instead of worrying about immediate needs. Even the situation in New England shows signs of improvement, better weather having enabled the movement of more coal from the southern tidewater ports via all-rail and Long Island Sound. Beyond Portland, however, the ports are still closed by ice. The shortage of vessels also continues to be a deterrent.

Though transportation conditions in general show marked signs of betterment, much of the freight congestion having been cleared away, there are still well-founded complaints of a shortage of empty cars at the mines.

Receipts of anthracite at tidewater are more plentiful; but the demands for this, as well as for any grade of coal, are still strong. Bituminous coal is extremely short. The output in January was the lowest for any month since September, 1914, owing to inadequate car supply and railroad congestions. "Give us more cars, and we'll flood the country with soft coal," say the bituminous operators.

Prices for the most part are based on contracts entered into before the Federal price regulations went into effect, and there is little, if any, spot coal offered. No new contracts are reported, the trade evidently waiting for the announcement of the new price schedule promised by the Fuel Administration before April 1.

The anticipated elimination of the jobbers' commission has caused much criticism, as it is considered that this branch of the trade performs an important function.

Great care is still necessary in distribution and consumption, as no great reserve stocks of coal exist. Bunkers and bins were scraped bare during the past three months, and coal will neither be cheap nor plentiful this year.—*Coal Age.*

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Truck Show in Brooklyn

BROOKLYN, N. Y., March 5—The first and only Greater New York show at which trucks were exclusively shown this season opened to-day in the Twenty-third Regiment Armory. Despite war conditions this is a larger show than last year, which was a record breaker. There are 102 chassis on view, representing 32 makers. There are also five styles of Ford adapters and two booths devoted to bodies.

The great majority of the exhibitors are truck dealers in the Metropolitan territory, and most of these are from New York City. Some Brooklyn dealers are represented and there are a few direct factory exhibits.

Men of the Industry

Changes in Personnel and Position

Bowman General Manager of Acason Motor Truck Co.

DETROIT, March 2—J. F. Bowman has been elected vice-president and general manager of the Acason Motor Truck Co. He was formerly vice-president and sales director of the company, prior to which time he was sales manager for the Federal Motor Truck Co. H. A. Conlon has been promoted from assistant sales manager of the Acason company to sales manager. He was formerly assistant sales manager of the Federal company.

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P. D. Sampsell has been placed in charge of sales of United States trucks in Indiana, Ohio and West Virginia. His headquarters will be in the Severn Hotel, Indianapolis.

J. C. Schmitz and **Robert H. Scott** have been appointed district representatives of the Dart Motor Truck Co., Waterloo, Iowa. Schmitz will handle sales in Oklahoma and Texas, and Scott those in New York and Pennsylvania.

Millard N. Newton, who has been connected with the advertising department of the White Co., Cleveland, for 5 years, has been appointed advertising manager.

J. Welch has been appointed western sales manager of the Freuhauf Trailer Co., with headquarters in Kansas City. He was formerly associated with the Abbott Corp. and the Inter-State Motor Co.

E. Wooler has abandoned the small car proposition on which he was working, and has returned to the Chandler Motor Car Co., Cleveland.

F. H. Burdette, formerly Pacific Coast manager of the Four Wheel Drive Co., Clintonville, Wis., has joined the sales organization of the Hercules Motor Truck Co., Milwaukee. He will have charge of sales in the Pacific Coast district.

W. K. Frederick has been appointed sales manager of the Gryphon Tire & Rubber Corp., New York.

L. M. Field, salesmanager of the Frank O. Renstrom Co., San Francisco, has been elected vice-president of the company.

J. B. Howell of the sales department of the Bound Brook Oil-less Bearing Co., Bound Brook, N. J., has entered active service in the United States army, and is now training at Camp Dix.

Earl Cooper, who has practically given up racing for the coming year on account of the decision of the American Automobile Assn. to sanction no races during the war, will devote the greater part of his time to an agency for Firestone tires in Sacramento, Cal.

Rodney K. Haines has been appointed sales manager of the Saxon Motor Co. of New York, Saxon distributor.

John Kennedy has been appointed director of social education of the Reo Motor Car Co., Lansing.

Lieutenant Gerald Fitzgerald has been promoted to the rank of major, and is reported to be somewhere in France. He was formerly manager of the Minneapolis branch of the Remy Electric Co. and later sold Marmon and Stewart trucks.

Beckwith Havens, who until recently was foreign representative of the Denby Motor Truck Co., Detroit, is now a lieutenant in the naval aviation service.

William H. Reese has resigned the secretaryship of the Convention and Good Roads Bureau of the Milwaukee Assn. of Commerce. He will become advertising manager of the Sterling Motor Truck Co., Milwaukee.

R. W. Mickam, formerly advertising manager of the Liberty Motor Car Co., and more recently head of the advertising department of the Ford Motor Co. of Canada, has joined the Carl M. Green Co., advertising agency, Chicago.

Walter P. Coghlan, Secretary of the Klaxon Co., Newark, who at the outbreak of the war joined the United States Navy, has been honorably discharged from the service owing to an injury to his back and has resumed his duties as secretary and sales manager of the company.

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H. Walter Staner Dead

LONDON, Feb. 27—H. Walter Staner, for many years editor of *The Autocar,* died on Sunday last from a complication of diseases which set in after a partial recovery from an attack of pneumonia. He also had editorial charge of the other automobile publications of the firm.

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Harry R. Radford Dies

DETROIT, March 2—Harry R. Radford, well-known in automobile and club circles, is dead. He was secretary and sales manager for the Motor Car Co., organized in 1904, which company name was later styled Carter Car Co. At the time this corporation was taken over by the General Motors Co. in 1907, he became vice-president and general manager, remaining with that company until 1915. Two years ago he became associated with the Radford Block Co., Oakland distributer.

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Changes in Velie Organization

MOLINE, ILL., March 3—The Velie Motors Corp. has made several changes in its organization. Charles R. Gardner, formerly manager of the Velie branch at Omaha, has been appointed assistant sales manager, and will be located at the Velie factory. L. H. Hazard, associated with the company for many years, has been appointed superintendent of production to succeed C. B. Rose, who was commissioned a major in the United States army. G. E. Martin will fill Hazard's place as chief engineer. F. D. Soper has been appointed purchasing agent and C. E. Mason traffic manager.

New Companies Formed

Latest additions to ranks of Automotive Industries

Organize Hebb Motors to Make Patriot Trucks

OMAHA, NEB., March 4—The Hebb Motors Co. has been organized in Lincoln to manufacture Patriot trucks of 1½ and 2-ton capacity. A factory is being built in Havelock, a suburb of Lincoln, which will be two stories high and 400 x 200 ft. As soon as the factory building is completed work will begin on a power plant, foundry and office building. It is expected that the company will be in production by fall.

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Dealers For Concord

CONCORD, N. H., March 4—The Abbott-Downing Truck & Body Corp. has been organized to absorb the Abbott & Downing Co., manufacturer of Concord trucks, and increase the output of Concord trucks and bodies. E. E. Vreeland, who has been associated with the Fulton Motor Truck Co. for the last 2 years, has been elected president and general manager. Until the present Concord trucks were sold exclusively at retail from the factory and Boston branch, but the new company will appoint agencies.

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Trucks Coming from St. Louis

ST. LOUIS, March 4—The Traffic Motor Truck Corp. has been organized here with $500,000 capital, and is rapidly getting into production a 2-ton truck to sell for $1,095. The company is headed by H. P. Mammen, formerly with the Westcott Motor Car Co. T. C. Brandle is vice-president and Guy Wilson, secretary and treasurer. Officials of the company say that numerous distributers' contracts have been made.

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Four Aviation Departments

WASHINGTON, D. C., March 5.—The proposal to divide the United States into four aviation departments was declared by the War Department to-day to have no connection with the many recent fatal accidents. The change is based entirely on administrative considerations. The recent accidents will bring no new important changes other than the enlargement of flying fields already announced. It is held that a certain number of deaths must be expected. The training schedule now in force requires each student to fly nine hours with an instructor before he is allowed alone. This compares with the four-hour schedule maintained under the regulations of the allies. American flying machines to-day have had one accident to every 2400 flight hours as against one to 1400 in the flying schools of the allies.

Day-Elders Company Making New 5-Ton Truck

NEWARK, N. J., March 2—The Day-Elders Motors Corp. has brought out a new 5-ton worm-driven truck, with a chassis capacity, including the body, of 14,000 lb. The wheelbase will be either 150 or 170 in., and the truck is assembled from standard parts, including a Buda 4½ by 6-in. L-head engine, a four-speed Brown-Lipe gearbox, a Savage Arms pressed steel frame 9 in. deep and Sheldon front and rear axles. The springs are 3 in. wide in front, and 48 in. long, and rear springs are 4 in. wide and 60 in. long. The truck has Ross steering gear, and solid front tires, 36 by 5 and rear 40 by 6 dual tires. The engine is fed by gravity to a Zenith hot-air-jacket carbureter.

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Olympian to Start 1918 Production

PONTIAC, Mich., March 2—The Olympian Motors Co. has orders for 500 of its new model cars, and expects to begin production on this model by March 25. The company shipped its last old model car a few days ago.

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Hays Mfg. Co. Building Addition

IONIA, MICH., March 4—The Hays Mfg. Co., maker of automobile bodies, is building an addition to its plant. This is a two-story building, and will be used for finishing work.

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Baltimore Plant for Kelly-Springfield

BALTIMORE, March 4—The Kelly-Springfield Tire Co. will erect a plant here which will cost $1,000,000. The main structure of the proposed works will be three stories high.

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Winther Truck Building New Factory

WINTHROP HARBOR, ILL., March 4—The Winther Motor Truck Co. has started work on the erection of a new factory in Kenosha, Wis., to provide facilities for handling a government contract for military trucks. The new plant will be ready by May 15, and the company will move there from its present quarters in Winthrop Harbor.

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Duplex Truck to Increase Production

LANSING, March 4—The Duplex Truck Co., according to H. M. Lee, president of the company, will increase its production to 300 trucks a month for the remainder of the year.

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Hawkeye Truck Buys Factory Site

SIOUX CITY, IOWA, March 2—The Hawkeye Truck Co. has purchased a 5-acre tract here for a new factory, and construction work will begin as soon as plans can be drawn. The building will be 75 by 300 ft., and will have the saw-tooth roof style.

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Jackson Munitions Ready to Start Production

JACKSON, Mich., March 2—The Jackson Munitions Corp., which has practically closed contracts for the old Mutual Motors Co. plant, is planning to start active operations in manufacturing shells by April 1. Two-thirds of the factory will be devoted to this work and between 800 and 1,000 men will be employed.

Production of shells will start within a week at the plant of the Jackson Automobile Co. Other plants that will engage in the manufacture of shells are the Jackson Cushion Spring Works, the Sparks-Withington Co., and the Mott Wheel Works. A committee of real estate men is making a canvass of the housing situation here so that homes may be obtained for the hundreds of men who will be brought to this city. Employment will be given to all available local workmen first.

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McNaull Shipments by Truck

TOLEDO, Ohio, March 2—Because of the difficulty in getting sufficient freight cars to make shipments to the east, the McNaull Tire Co. has started two motor trucks, loaded with tires, to New York and Paterson, N. J. If the experience is a success it is planned to put other trucks into service to make long haul deliveries.

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20 F. W. D. Trucks Daily

CLINTONVILLE, WIS., March 2—The Four Wheel Drive Auto Co. is now manufacturing between 20 and 25 complete 3-ton trucks a day. The government has erected barracks near the factory where 200 officers and men of the ordnance department make their headquarters when receiving instructions in the operation and care of the F. W. D. trucks in the established school of the plant. The course lasts 4 weeks for privates and 3 weeks for officers.

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Martin Aircraft Plans Building

CLEVELAND, March 3—Plans for the Glenn L. Martin Aircraft producing building were filed with the city building department. It is reported that a site will be selected shortly and that the building will be rushed to completion.

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Goodyear Marketing Cord Patch

AKRON, Ohio, March 1—The Goodyear Tire & Rubber Co. is placing on the market a cord patch for repairing inside breaks and injuries in cord tires. The patch is built of several layers of cords, the same construction being used as in cord tires. Edges are tapered to prevent tube chafing and the patch is inserted in the same way as an ordinary blowout patch, the surface in contact with the shoe being skim-coated with a layer of uncured gum.

Current News of Factories

Notes of New Plants—Old Ones Enlarged

Buda Engines Made by Other Companies for U. S.

HARVEY, ILL., March 2—The Buda Co. has licensed the United States government to contract with outside manufacturers for the production of Buda "HU" 4-cylinder 4¼ x 5½ in. engines. This engine has been adopted as a standard for certain government vehicles for the duration of the war, and the output of the Buda company is not sufficient for government requirements. Outside companies manufacturing these engines will be permitted to sell them only to the United States, and not to private organizations.

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Gillette Rubber Increases Output

EAU CLAIRE, WIS., March 4—The Gillette Rubber Co. is increasing its output from 500 tires to 1500 tires a day. Before the close of summer it is hoped to bring the capacity up to 2000 tires a day.

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Kissel Erecting Additions

HARTFORD, WIS., March 5—The Kissel Motor Car Co. has awarded contracts for the erection of two factory additions to provide extra facilities for handling the government contract for military trucks.

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DIVIDENDS DECLARED

INDIANAPOLIS, March 2—The Stutz Motor Car Co. has declared a quarterly dividend of $1.25 a share on common stock, payable April 1, to stockholders of record March 15.

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DETROIT, March 2—The Packard Motor Car Co. has declared the regular quarterly dividend of 1¾ per cent on preferred stock, payable March 15 to stock of record February 28.

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BUFFALO, March 2—The Pierce-Arrow Motor Car Co. has declared the regular quarterly dividend of 2 per cent on preferred stock, payable April 1 to stockholders of record March 15.

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CHICAGO, March 2—The Union Carbide Sales Co. has declared a regular quarterly dividend of 2 per cent, payable April 1 to stock of record March 12.

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AKRON, Ohio, March 2—The Firestone Tire & Rubber Co. has declared the regular quarterly dividend of $1.25 a share, payable March 20 to stock of record March 10.

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NEW YORK, March 4—The Linde Air Products Co. has declared a regular quarterly dividend of 2 per cent on common stock and 1½ per cent on preferred stock, payable March 30 to stockholders of record March 20.

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CHICAGO, March 4—The Stromberg Motor Devices Co. has declared the regular quarterly dividend of 75 cents a share on common stock, payable April 1 to stock of record March 15.

Uruguay Buying American Cars

European Cars No Longer in the Market—1500 Fords Sold in 1917

MONTEVIDEO, URUGUAY, Jan. 1—The European war continues to keep the European automobile entirely out of the Uruguay market. The summer season, which is just passing, has been a very satisfactory one for the sale of cars here. Ford leads in the number sold and the increase in the use of them is nothing short of amazing, as buyers almost stand in line with cash in hand waiting to get their turn at buying. Over 1500 Fords have been sold this year, and now nearly every other car seen in the country is a Ford. The sale of Studebakers, both four and six-cylinder models, by Coates Bros., has been good, and now these machines are seen all over the Republic. Cadillacs have sold in greater quantities than any other high-priced cars. The Hudge has made strong progress since introduced here 2 years ago. Buicks, Maxwells and Overlands are doing well in this market.

Up to the present the motor truck is scarcely known in Uruguay so far as the country is concerned, although there are goodly numbers of them in Montevideo with its population of 375,000. Labor shortage is what this country is facing at present, and is going to face for several years, and this is going to make a market for the motor truck.

Farm tractors are scarcely more than heard of in Uruguay, although several dealers here believe that if they had an opportunity of visiting a demonstration in U. S. A., which would give them a definite line on tractor performance, that they would be able to make good sales to the farmers of Uruguay. Population is what is needed more than anything else in the farming sections of Uruguay, and the farm tractor should be the one effective means of making up for labor shortage. The shortage of mechanical help is one of the great handicaps to the truck and tractor.

Complaints are heard too frequently in Montevideo concerning extortionate shipping rates which are exacted by exporters in the U. S. A. To quote the exact words of one Montevideo automobile dealer, he says: "You will find cars on the same steamer for which shipping rates are at the rate of 67½ cents per cubic foot, $1.20 per cubic foot, $1.80 per cubic foot and even $2 per cubic foot. I guess the steamer all the way through gets about the same 50 cents per cubic foot rate and the balance goes to the forwarding pirates. It is all right so long as the United States has a literal monopoly because of war conditions, but give us 10 minutes' peace conditions and sooner than buy the Yankee car which we want, and for which we are soaked on the ocean shipment, we will buy the European car we do not want, but on which we get a square deal on ocean shipments. American manufacturers apparently do not realize that this is a detail of importance."

There should not be any difficulty in having this abuse remedied. Could it not be stopped in 10 minutes by the custom's port authorities refusing clearance to any steamer not endorsing on each bill of lading the exact freight collected for the carriage or transportation of that particular parcel of goods? The result would be that the Montevideo dealer would know exactly what shipping rates were paid.

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Osborne Working for Industrial Peace

WASHINGTON, March 2—Loyall A. Osborne, New York, vice-president of the Westinghouse Electric & Mfg. Co., and chairman of the executive committee of the National Industrial Conference Board, has been appointed by the Secretary of Labor a member of a committee on industrial peace during the war. This committee, which consists of five representatives of employers, five labor leaders and two others, will provide a definite labor program for industrial peace during the war to prevent interruption of production.

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Optician Shop Trucks for France

WASHINGTON, March 3—Motor trucks will perform a new service in France. Various makes of 5-ton military trucks are being equipped with complete shops to manufacture lenses for spectacles for our soldiers. The trucks will operate within 15 to 50 miles of the front lines and will make glasses for every soldier requiring them. Stocks of optical glass and the parts of spectacles and nose-pieces will be maintained at base depots in large quantities and will be carried on board the trucks in such amounts as can be handled. The trucks will be equipped with cabinets for holding the stock, machines for grinding lenses, producing spherical surfaces, automatic and hand-operated edge-grinding machines, tools, gauges, etc. There will be two drivers and two optical repairmen on each truck.

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Complaints Against Paint Makers

WASHINGTON, March 2—The Federal Trade Commission to-day authorized the issuance of complaints charging thirty-eight paint, varnish, soap and ink concerns with various unfair methods of competition in violation of Section 5 of the Federal Trade Commission Act. This is the largest number of complaints ever acted on at one time. The complaints allege the concerns stifle and suppress competition through lavish entertainment of competitors' employees, secret payment of money to employees of customers who might otherwise buy goods from competing concerns, and in one instance the respondent is charged with the adulteration of competitors' goods. The firms named in the complaints are given the usual 30 days to reply, and have been notified that the commission will hold a hearing on all complaints in question on the morning of April 8 next.

Favor U. S. Tractors in Europe

Italy, Switzerland, New Zealand and South Africa Buying American Products

WASHINGTON, March 5—American tractors are gaining ground abroad, according to reports received by the Department of Commerce from consuls in various cities of Switzerland, Italy, New Zealand and South Africa. Tractor manufacturers are paying more attention to the foreign field, and are eliminating features of mechanism objected to in Europe.

This is especially true in Italy. Several Italian rice cultivators have stated that they did not consider American tractors suitable for the requirements of the uneven Piedmontese land. A well-known American company, after careful study, changed its tractor so as to eliminate the features which had militated against the successful operation of the tractor in Piedmont. At present Italian rice cultivators are appreciative of American products.

As a first step to increased trade in Italy, tractor manufacturers should issue circulars in Italian for distribution among farmers there.

During the war the Swiss peasant has been paying more attention than previously to American agricultural machinery. Trials of American motor plows were recently undertaken by the Zuckerfabrik Aarberg, Aarberg, Switzerland, and by the Landwirtschaftliche Schule Rutti bei Berne, Switzerland. The results favorably impressed the various experts of the agricultural associations.

In South Africa, imports are being curtailed with a view to conserving all available shipping space for necessaries. Nevertheless, American products are easily obtained, and a good foundation for future trade should be established. Medium sized tractors with good power, which can be utilized for traction plowing, operate successfully. The tractor should be easy to operate and as nearly foolproof as possible. Purchasers should be thoroughly instructed in the use of the tractor, and spare parts should be easily obtainable.

Great care should be taken in granting exclusive agency rights. Importing dealers in agricultural machinery and implements are usually the most satisfactory representatives, as they generally have various branches or connections and have an established trade in farming communities.

Reports from New Zealand state that the demand for tractors is not large at present, but that a good market could readily be developed. The district is flat, and most of the grain is grown here. Traction engines from the United States are taxed 10 per cent. In order to obtain a footing, it would be necessary either to open a branch or grant an exclusive agency to some established firm.

Export Regulations Altered

WASHINGTON, March 2—Following the report of the War Trade Board 2 weeks ago, AUTOMOTIVE INDUSTRIES published a statement to the effect that collectors of customs would accept a shipper's export declarations in lieu of an individual license, for all goods which had not required licenses prior to the President's recent export and import proclamation. This was under the provision that it be shown to the satisfaction of the collectors that the goods were covered either by a bill of lading marked "for export," or a through export bill of lading, provided the bill of lading was dated Feb. 19, 1918, or earlier and provided that the goods were actually exported by March 15th. The War Trade Board assumed when it made this statement that all exporters interested in above described shipments would immediately apply for export licenses and receive them in ample time to be used on or before March 15, 1918.

The War Trade Board now says that there is at present a considerable congestion of freight at various points which will make it impossible for all goods covered by the above ruling to be exported on or before March 15, 1918. To take care of the situation the Board has adopted the following form of procedure to be used in those cases where the goods, which did not need a license prior to the proclamation, are covered by either a bill of lading marked "for export" or a through bill of lading dated February 19, 1918 or earlier.

Any exporter or shipper interested in shipments of this character which are not to be exported by March 15, 1918 should present his export declarations in quadruplicate, under Form Customs Catalog No. 7525, to the nearest branch office of the War Trade Board. This branch office will license the shipments on the export declaration without requiring the shipper or exporter to file a formal application.

These export declarations when licensed will be of use only if the goods are exported by April 15, 1918. If any shipper or exporter has reason to believe his shipment will not be exported by this date, he has several weeks within which to file a formal application and receive a license valid for the usual period.

Shippers should not wait until July 15 to file formal application if shipments cannot be exported before that date. The application should be filed immediately, to fully protect the shipper if the formal license becomes necessary later.

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Tractors Shown at Columbus Show

COLUMBUS, OHIO, March 2—The Ninth Annual Columbus Automobile Show which opened Feb. 27, at Memorial Hall, included farm tractors as well as passenger cars. Because of lack of space, no motor trucks were shown. An unusually large crowd attended the show, on the opening night, and several sales were reported. Passenger cars and tractors were exhibited on the main floor, and accessory dealers and manufacturers had booths in the balcony. The show was held under the auspices of the Columbus Automobile Show Co., a corporation composed of several Columbus dealers.

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Thayer on Aircraft Board

WASHINGTON, March 2—Harry B. Thayer, New York, has been appointed a member of the Aircraft Production Board by President Wilson.

Need Workers for Ordnance Department

WASHINGTON, March 4—The Ordnance Department of the United States Army has issued a call for civilian workers with a high school education and some shop training. Applicants will receive the necessary training under government instruction, and will receive appointments as soon as this short course of training is finished. Those who have the required technical training will be assigned to ordnance work immediately in the following positions:

Inspectors and assistant inspectors, field artillery ammunition steel.
Inspectors, artillery ammunition, cartridge cases, assembling, loading, forging, primers, detonators, shell and shrapnel machining.
Ballistic inspectors.
Metallurgical chemists and assistants.
Inspectors, powder and explosives.
Inspectors, cannon, forging operations.
Inspectors, gun carriages and parts.
Inspectors, gun fire control instruments.
Assistant inspectors, motor vehicles and artillery wheels.
Engineers and assistant engineers for tests of ordnance materials.
Inspectors, ammunition packing boxes.
Machinists accustomed to work to 1000ths of inch.

Applications should be mailed to C. V. Meserole, special representative of the Ordnance Department, U. S. A., Room 800, 79 Wall Street, New York City.

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Recommend Daylight Saving Bill

WASHINGTON, March 4—The United States Chamber of Commerce, through its committee on daylight saving, recommended the prompt passage by Congress of the Daylight Saving Bill. Fifty-two important reasons were given in the recommendation.

Calendar

ASSOCIATIONS

April 15-19—Little Rock, Ark., United States Good Roads Assn. Sixth Annual Session.
June 5-12—Hot Springs, Va., National Assn. Automobile & Accessory Jobbers.
June 17-19—Dayton, O., Society Automotive Engineers, Annual Midsummer Session.

SHOWS

Mar. 1-15—Lyons, France, Third Sample Fair.
Mar. 2-9—Boston, Mass., Boston Auto Dealers' Assn., Mechanics' Bldg. Chester I. Campbell, Mgr.
Mar. 2-9—Pittsburgh, Pa., Automobile Dealers' Assn. of Pittsburgh, Motor Square Garden. John J. Bell, Mgr.
Mar. 4-9—Utica, N. Y., Utica Motor Dealers' Association, Inc., State Armory.
Mar. 6-9—Clinton, Ia., Clinton Automobile Dealers' Assn., Coliseum.
Mar. 6-9 — Watertown, N. Y., Automobile Dealers, Inc., State Armory. Arthur E. Sherwood, Mgr.
Mar. 6-9—Mason City, Iowa. Annual Car and Truck Automobile Dealers' Assn.
Mar. 6-9—St. Joseph, Mo., St. Joseph Automobile Dealers' Assn., Auditorium. John Albus, Mgr.
Mar. 6-9—Little Rock, Ark. First Annual Car and Truck Show. Liberty Hall.
Mar. 6-9—Sioux Falls, S. D., S. D. Automobile Dealers' Assn.
Mar. 11-16—Cedar Rapids, Ia., Cedar Rapids Auto Trade Assn., Auditorium.
Mar. 11-16—St. Louis, Mo. Used Car Show. St. Louis Auto. Manufacturers and Dealers' Assn. Exhibit Bldg.
Mar. 12-15—Fargo, N. D., Gate City Auto. Show Co., Auditorium. J. W. Murphy, Mgr.
Mar. 13-16—Raleigh, N. C., Auditorium. John Kelley, Mgr.
Mar. 13-16—Warren, Pa., Warren Automobile Dealers' Assn., Russell Garage.
Mar. 13-16—Peoria, Ill., Peoria Auto. Accessories Dealers' Assn. W. O. Ireland, Mgr.
Mar. 15-20—Great Falls, Mont., Montana Automobile Distributors' Association, Lexington Garage. A. J. Breiteastein, Mgr.
Mar. 19-23—Vancouver, B. C., Western Canada Automobile Show Assn., Horse Show Bldg. D. A. Hamilton, Mgr.
Mar. 20-22—Houlton, Me., Second Annual, Houlton, Motor Car Dealers' Assn., Bangor St. Exhibition Hall. J. D. Luther, Mgr.
Mar. 20-23 — Holdredge, Neb., Second Annual of Southwest Nebraska.
Mar. 20-23—Greensboro, N. C. First Annual. John Kelly, Mgr.
Mar. 20-23 — Trenton, N. J., Trenton Auto Trade Assn., Second Regiment Armory. John L. Brock, Mgr.
Mar. 25-30—Rochester, N. Y., Tenth Annual. Rochester Auto. Trades Assn., Exposition Park. C. A. Simmons, Mgr.
Mar. 25-30 — Bridgeport, Conn., Fourth Regiment Conn. Home Guard State Armory and Casino. B. B. Steiber, Mgr.
Mar. 27-29—Fort Fairfield, Me., Reed's Garage. R. F. Reed, Mgr.
Mar. 30-April 6—Hartford, Conn., Eleventh Annual, Hartford Automobile Dealers' Assn., Inc. State Armory. B. F. Smith, Mgr.
Mar. 30-Apr. 6 — Atlantic City, N. J., Second Annual. Garden Pier. S. W. Megill, Mgr.
Mar. 30-Apr. 6—Chicago, Ill. Second Annual Chicago Used Show. Chicago Auto. Trade Assn. Coliseum.
Apr. 1-6—York, Pa., York Auto Dealers' Assn. T. F. Feiffer, Mgr.
Apr. 6-8 — Green Bay, Wis., Brown County Automobile Trade Assn.
Apr. 6-13 — Red Bank, N. J., Monmouth County Auto. Dealers' Assn., Armory, E. C. Von Kattengell, Mgr.
Apr. 8-13—Reading, Pa., Reading Automobile Trade Assn.
Apr. 9-13—Stockton, Cal., Third Annual San Joaquin Auto Trade Assn. Samuel S. Cohn, Mgr.
Apr. 16-20—Deadwood, S. D. City Auditorium.
Apr. 17-19—Davis, Cal., Tractor Demonstration. University of California.
Apr. 17-20—Calumet, Mich., Upper Peninsular Show, Copper County Automobile Dealers & Garage Owners' Assn., Coliseum.
May 3-7 — Lima, Ohio. Ohio State Automobile Asn.
Sept. 23-28 — Chicago, National Accessory Show for Fords, Coliseum.

ENGINEERING

American Society of Heating and Ventilating Engineers.
Mining and Metallurgical Society of America.